

Chemical Age

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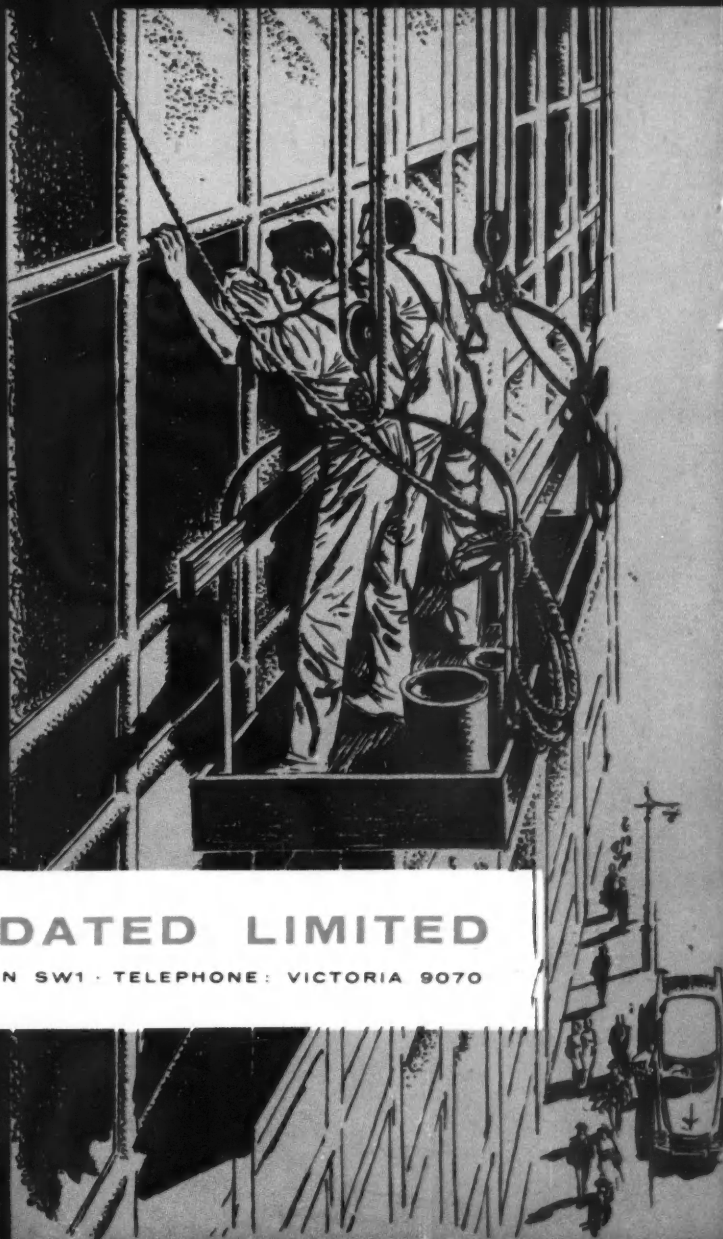
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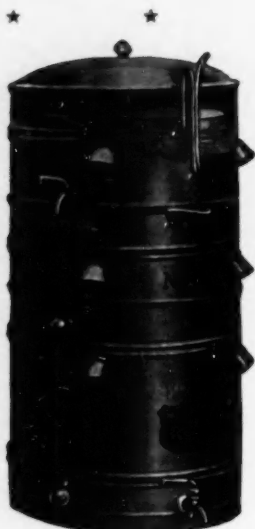
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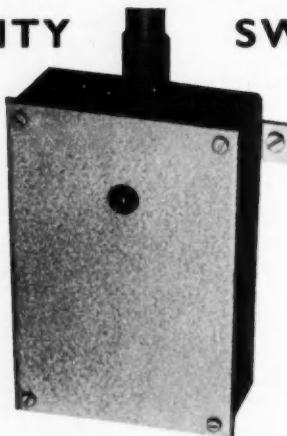
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AMMONIA

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The first operation is to produce hydrogen and carbon monoxide from methane. In the primary reformer, about 70% of the feed gas is converted into raw synthesis gas in the presence of steam using a nickel catalyst. The effluent is sent to the secondary reformer where air is introduced to supply the nitrogen for ammonia. The heat of combustion of the partially reformed gas provides the energy to reform the remainder of the gas. Maintenance of charge stock pressure at a high level through the gas preparation section reduces the compressor horsepower requirement 30/40% as compared to that required for low pressure reforming processes.

From the secondary reformer, the mixture is quenched and sent to the shift converter where carbon monoxide is converted into carbon dioxide and additional hydrogen is produced. The synthesis gas is purified as shown on the flow sheet and then charged to the catalytic ammonia converter. The Kellogg developed ammonia converter operates at about 4700 psig and permits accurate temperature control inside the catalyst mass by a quenching system. Essentially isothermal conditions are achieved thereby inhibiting a cause of catalyst activity deterioration.

Kellogg high pressure steam methane reforming ammonia plants are producing well over a 1000 tons of anhydrous ammonia per day. Kellogg engineers welcome the opportunity to present the overall economics of this process for specific plant sites.



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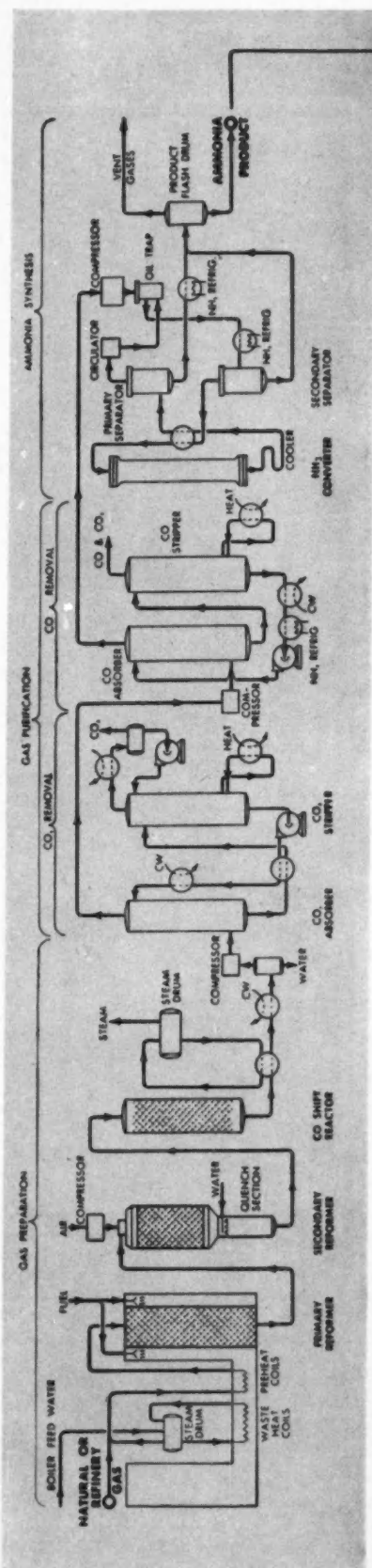
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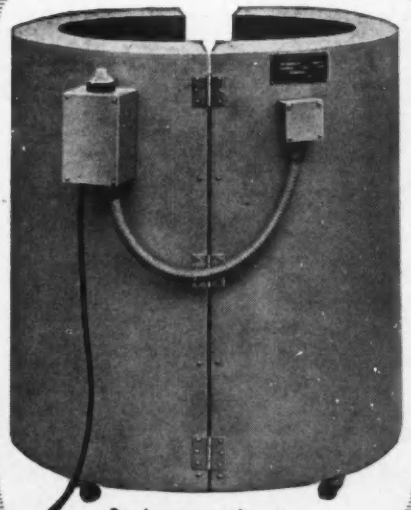
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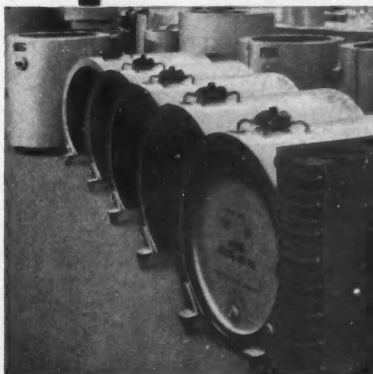
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Back view showing
Thermostatic control



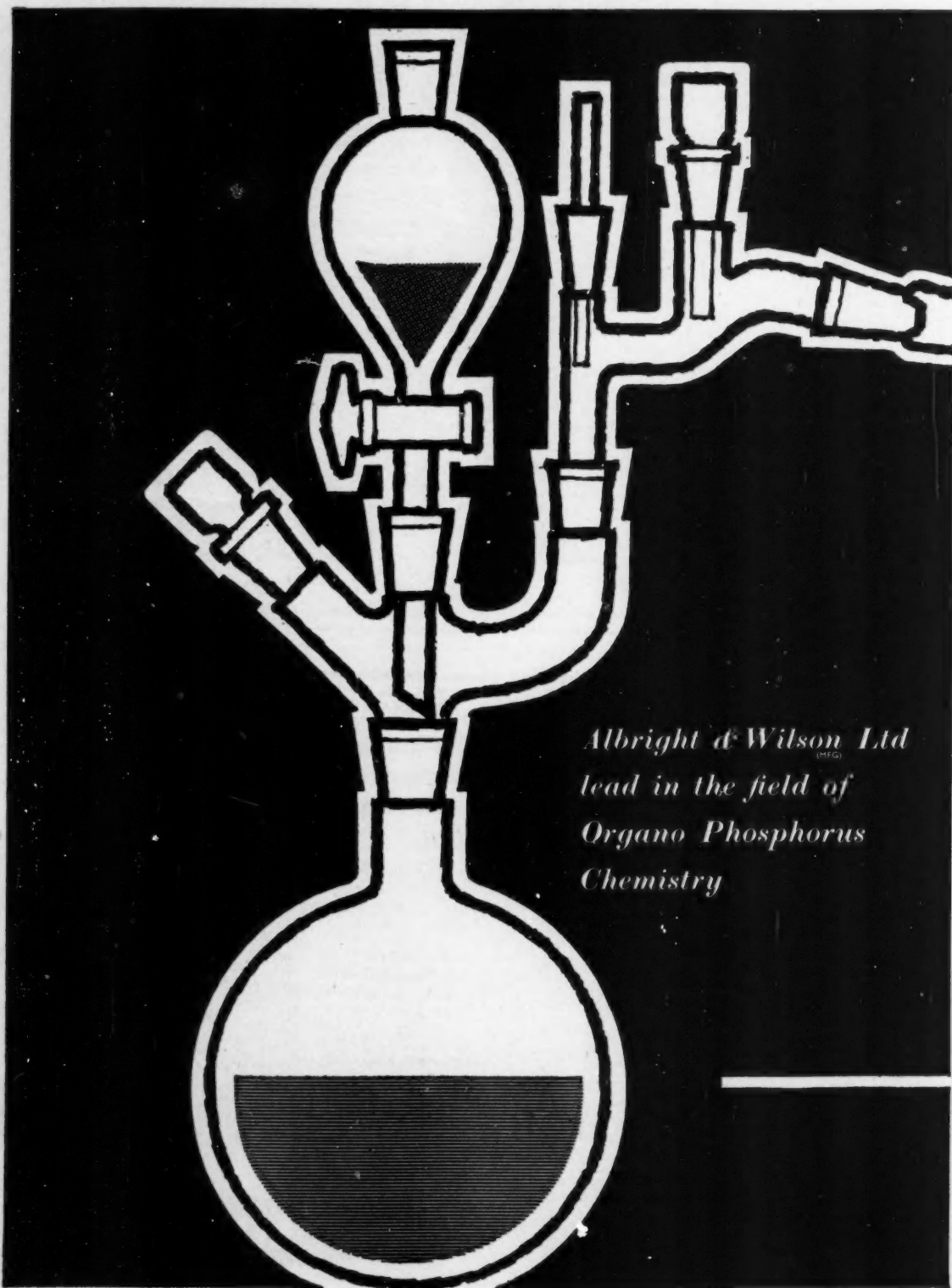
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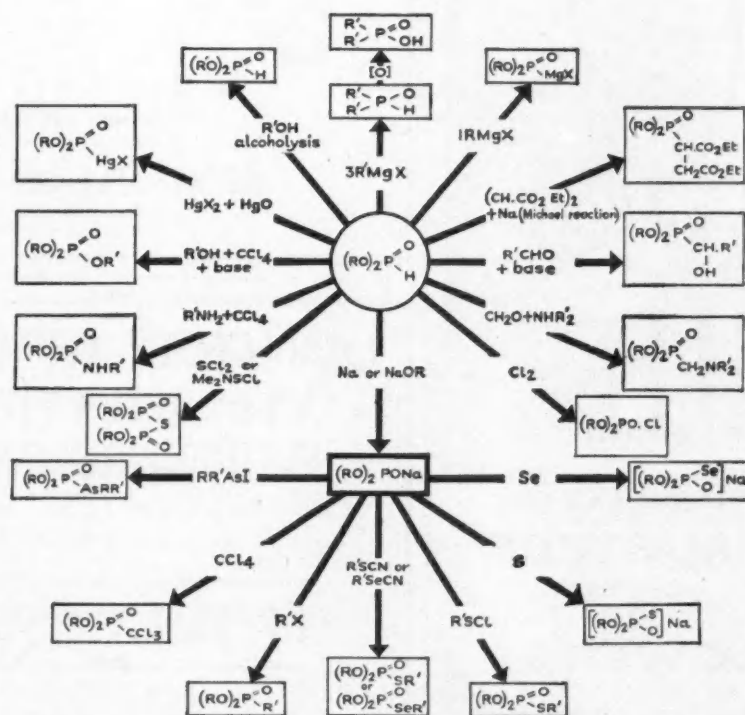


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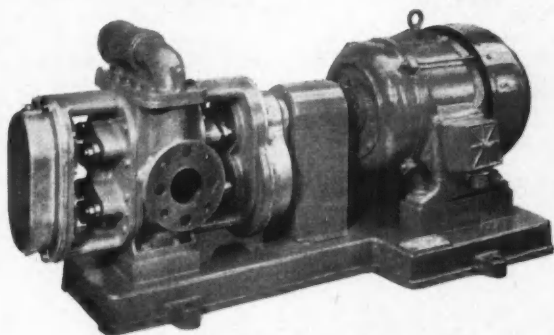
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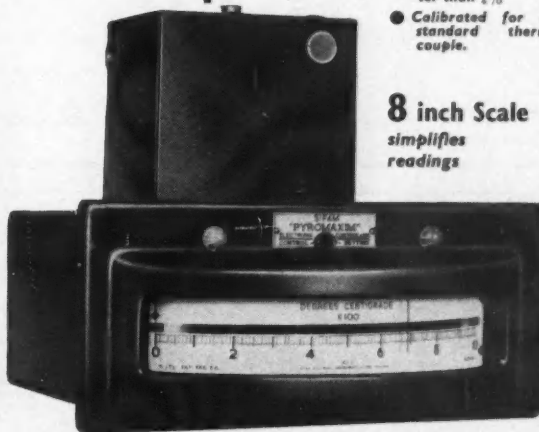


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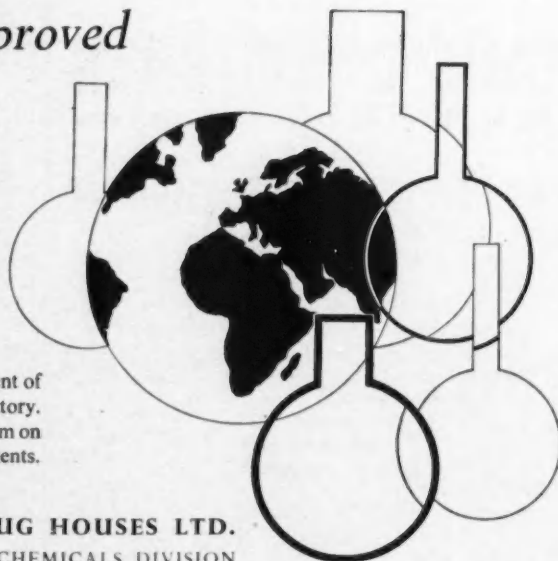
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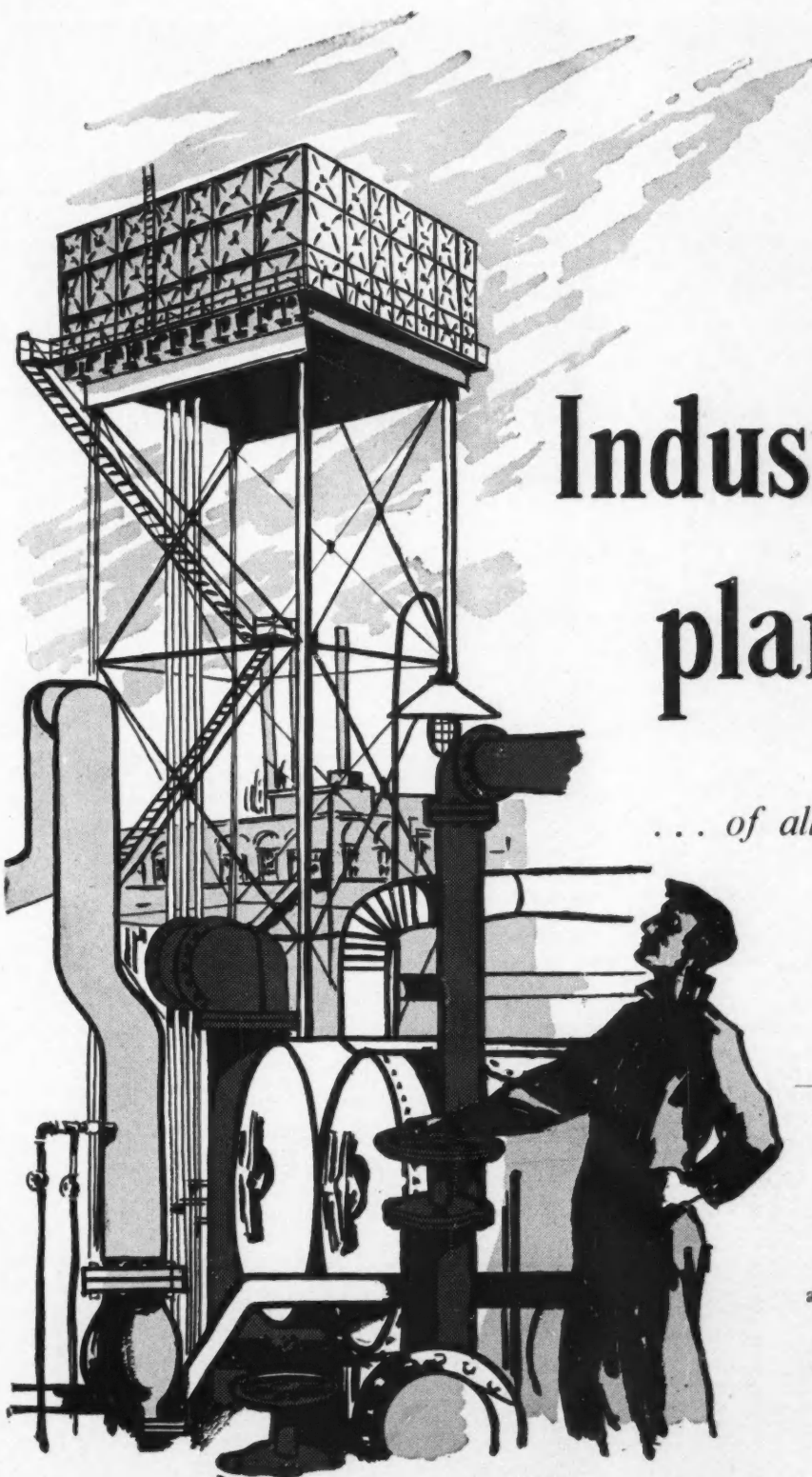
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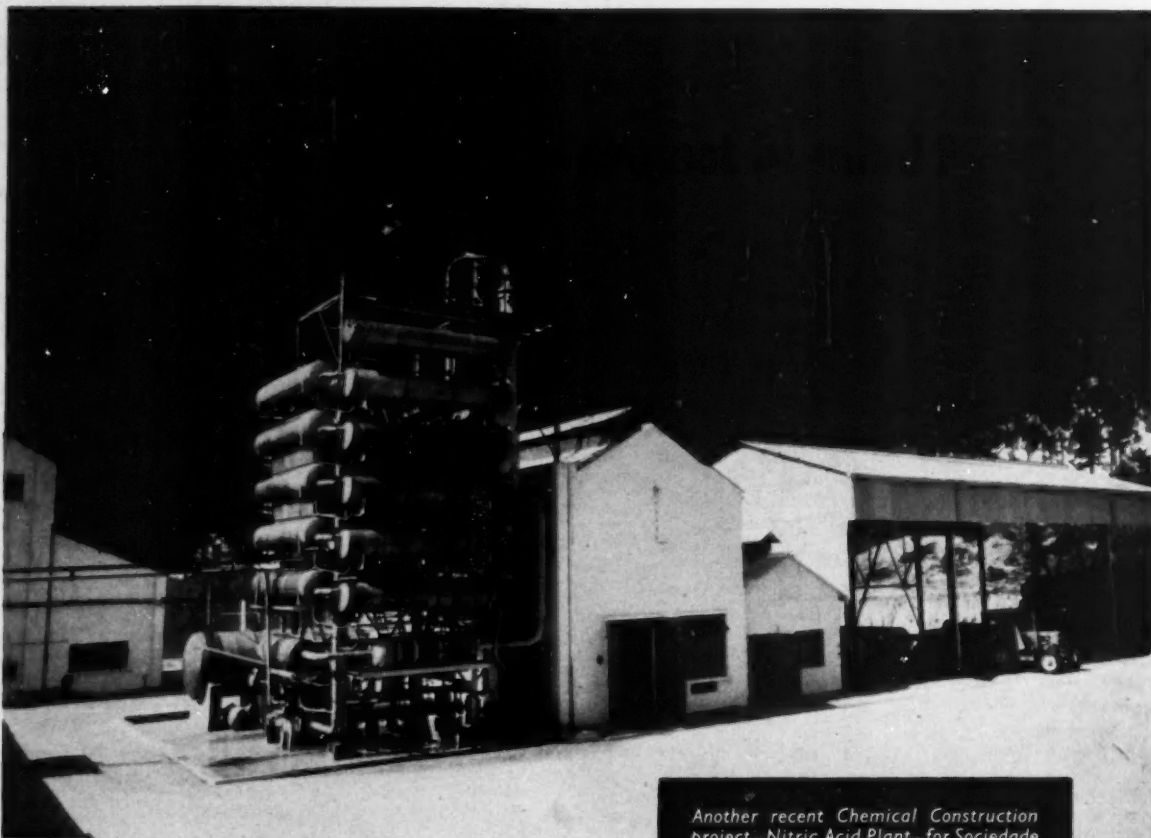
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CHEMICAL AGE

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AGRICULTURAL CHEMICALS

TEN years ago the discovery and development of MCPA and 2,4-D were described as the greatest practical contribution which science had made to British agriculture. Today nearly 50 herbicides are available commercially, most of them being based on 2,4-D or 2,4,5-T. In the herbicide field there is still a great growth potential, for losses due to weeds are stated to still be twice those due to insects.

Marked progress and development has been made in chemical weed killers, and as Dr. E. K. Woodford of the A.R.C. Unit of Experimental Agronomy, Oxford University, said in a lecture to the Farmers' Club recently, if new weedkillers continue to be discovered at the same rate as over the last decade, it is not hard to visualise that in the not too distant future, herbicides will be used for selective control of weeds and in most horticultural and agricultural crops, etc., and cultivation will be reduced merely to the preparation of a seedbed and maintaining soil tilth. Thus, chemicals such as dalapon and aminotriazole, which are proving beneficial for killing grass swards before reseeding, are replacing the plough not only as weedkillers but as tools for seedbed preparation. Dalapon, absorbed by both leaves and roots, has been proving useful for grass control in growing crops such as lucerne, beet, asparagus, rhubarb and other vegetables. It acts slowly apparently inducing prolonged dormancy in susceptible plants.

An important current trend in the weedkiller field is towards specific herbicides, such as the substituted triazines, for example, Geigy's simazine (2-chloro-3,6 bis (ethyl amino)-S-triazine which has a very long-lasting effect in soil (up to a year or more). Simazine is now available commercially in this country through Fisons Ltd., as Weedex (see p. 320). There is also a range of soil-acting mixtures of horticultural interest based on 2,4-DES, CIPC and tenuron. Other soil fumigants are D-D mixture, and methyl bromide, and sodium methyl-dithiocarbamate. Boron compounds, also are being investigated, as crop protection agents (see p. 333).

In cereals, only wild oats and blackgrass are stated to resist chemical attack, CMPP and TBA/MCPA mixtures controlling weeds unaffected by MCPA and 2,4-D endothal and CIPC mixtures applied at drilling time are reported as having encouraging weed-killing powers. A really effective weedkiller for use among kale and other brassicas, however, has still to be found.

Chemical weed control has now become quite complicated and is likely to become very much more complex. Adding to the problem is the number of proprietary names, and the difficulty of relating officially recommended dosage rates, stated in ounces of active ingredient per acre, with those on maker's labels expressed in pints per acre. Registration of products, with declarations as to nature and content of active ingredients, it has been suggested, would be of value to farmer and adviser alike.

Another section of agricultural chemicals which during the last year or so has shown remarkable development is that of the pesticides. Emergence of resistant strains of insects necessitates constant changeover in products, and emphasis on compounds having still higher potency. Because of its

selective, positive action, biological control of insects, involving the use of specific viruses or bacilli, is under investigation, and also the use of radiation sterilisation.

One noticeable feature of present-day insecticides is the shift from the chlorine family to the phosphate family. Because of their higher toxicity levels, phosphate compounds can usually be used in smaller quantities compared with chlorine-based insecticides, and hence there is a cost advantage. Also, as phosphates tend to be non-residual, they find favour with regulations stipulating residual tolerances. In the U.S., one of the newer organo-phosphate compounds is Trithion by Stauffer Chemicals (*O*, *O*-diethyl-*S*-*p*-chlorophenyl thiomethyl phosphorodithioate).

Systemic insecticides of interest include Systox, now stated to be widely used in the U.S. In this country, systemic non-phosphorus insecticides are viewed with favour, in particular fluoroacetamide. There is evidence that fluoroacetamide is not only a systemic insecticide but a contact insecticide as well (see p. 323). It is reported that this chemical is finding special favour because of its low animal and human toxicity.

It is not known how much money was spent in the U.K. last year or in recent years on research and development in the pesticide, herbicide fields, etc. In the U.S., however, some \$20 million was spent in 1958 in research and development of new basic pesticide products and it is generally expected that there will be an increase in expenditure in future years. At the same time the cost of developing, producing and distributing pesticides, like other speciality chemicals, is increasing each year, while profit margins decrease by a similar margin. U.S. pesticide, herbicide, etc., industry is therefore stated to be placing increased importance on marketing and distribution patterns and on more efficient plant operations. With careful planning much greater growth in agricultural chemicals can be expected.

MORE NEW STEROIDS

WITH the start of the second decade for corticosteroids new steroid compounds have recently been announced by two leading U.S. steroid manufacturing companies, Syntex S.A. and Schering. Syntex S.A. have a new class of cortical hormones (the 6- α -chlorocorticoid) and Schering have another (16-methylated corticoid). Both compounds are claimed to be more potent than hydrocortisone and to allow the excretion of sodium.

Some dozen α -chloro-corticoids have been prepared by Syntex. They are either 6- α -chloro- or 6- α -chloro-9- α -fluoro derivatives of cortisone, hydrocortisone, prednisolone and prednisone. Potencies are stated to range up to 200 times that of hydrocortisone. Of the compounds 6- α -chloroprednisone, 6- α -chloroprednisolone, and 6- α -chloro-9- α -fluoro-16- α -hydroxyhydrocortisone-21-acetate-16, 17-acetonide (and its corresponding 1-dehydro-compounds) are stated to show marked sodium excretion, which has raised hopes that a diuretic steroid may emerge without the anti-inflammatory action of present-day corticoids.

Preparation of these new corticoids involves conversion of an unsaturated steroid to the enol ether form. This is then treated with *N*-chlorosuccinimide to form the β compound. Acid treatment reverts the β form to the α form. Latest corticoid on the U.S. market is Merck's Dexamethasone (previously hexadecadrol), claimed to be 40 times more potent than hydrocortisone in human therapy and to cause fewer side reactions.

Sales of corticosteroids in the U.S. in this year are expected to reach \$120 million, a 20% increase over 1958 sales. (In 1950 sales were valued at \$13 million). Sales of cortisone are expected to be about \$8 million this year (against \$13 million in 1950). Hydrocortisone is likely to claim 30% of the 1959 U.S. corticoid market, and

prednisone and prednisolone are expected to be around the \$30 million mark, with methyl prednisolone and triamcinolone claiming about \$15 million. Merck's Decamethasone is expected to run to sales valued at \$30 to \$35 million.

Of all prescriptions written by U.S. physicians 9% are for corticoid drugs (antibiotics 15.5% and tranquilisers 10%). The reason for these mounting sales is the wide use of the corticosteroids in the treatment of a large number of ailments. Research in the steroid field among U.S. pharmaceutical houses is intense, with all aiming at developing the use of corticosteroids and reducing the side-effects associated with the present corticosteroids.

FERTILISER CHARTERINGS

BY contrast with the somewhat depressed condition of the steel trades so far as ship chartering is concerned, shipments of fertilisers and the raw materials for that industry appear in a healthy state. More bookings for sulphur, pyrites and phosphates were recorded in January than for many months past and the finished products of the industry also moved off in good volumes.

This is stated in *Monthly Freight Review*, which performs a useful service to industry because generally dissemination of shipping news tends to be patchy. Yet fluctuations in freights and market tendencies are vital to buyers and sellers of prime industrial materials which have relatively low f.o.b. values and where the sea-freight element plays a big part in the cost of the end-product.

It is stated that one U.K. producer of superphosphates is actively exploring the time-charter market and seeking offers for the hire of tonnage of various sizes to carry his raw materials for as long as 10 years ahead. Continental buyers of phosphate, who not long ago stated that their buying programmes were completed for two years, are showing renewed interest in freights.

Although precise details are lacking, it seems that U.K. importers of rock phosphate from the Pacific Isles have obtained freight cover for a considerable period and this in one of the most unpredictable sections of the market, at freight rates which appear favourable for the consumers.

China is increasing in importance as a buyer of manufactured fertilisers, nitrogen fertilisers in particular, and as a producer of superphosphate. Big movements of crude phosphate are taking place from Morocco to China, the Government of Morocco having made a barter deal with Communist China covering about 500,000 tons of phosphates a year. Price is said to be considerably lower than that paid by the traditional U.K. and Continental customers of the French phosphate 'Comptoir'. Despite competitive f.o.b. prices and cheaper sea-freight, U.S. producers of pebble phosphate are prevented from tendering.

Among recent charterings for the U.K. heavy chemical and fertiliser industries are the following: Sulphur, Galveston to U.K., 9,000 tons at 48s per ton and 40-60,000 tons over July-December at 53s per ton (f.o.b., ship paying current rate discharge—c.r.d.).

Pyrites, Huelva to Ipswich, 3,000 tons at 31s (ship pays 2s 6d per ton load and c.r.d.); Morphou Bay to U.K., west coast, 9,500 tons at 38s (2s 6d per ton load and c.r.d.).

Phosphates, Casablanca to Hull, 2,200 tons at 36s 9d (1s 6d per ton load and c.r.d.); Nauro and/or Ocean Island to U.K., contracts totalling 200,000 tons over the fertiliser year to June 1959 at equivalent net f.i.o. ('free-in-and-out') freight of 65s per ton and 200,000 tons over year 1959 to June 1960 at 63s per ton net f.i.o.

Potash, Barcelona to U.K., 1,000 tons at 36s and 2,200 tons at 32s 6d f.i.o. Nitrogen fertilisers, Leghorn to U.K., 1,740 tons at 47s 6d f.i.o.

Enquiry into Water Supplies for Ashburton Chemical Works

How to supply a proposed new factory for Ashburton Chemical Works Ltd., of Manchester and Middleton, with its needs of 3,000,000 gallons of fresh water a day, was the subject of a public enquiry at Brynaerau, North Wales. For some months discussions have been proceeding between the company and Caernarvonshire County Council about setting up a factory at Glynllifon, about ten miles outside Caernarvon. Gwyrfael Rural Council wanted to build a dam across the Llynfni River at Craig Dinas, but Gwynedd River Board thought a direct supply of water from the Nantlle would be more practicable.

Mr. Norman Rowntree, civil engineer for the Gwyrfael Council said the cost of the scheme would be met by the chemical firm, and the council could not charge them for some other industrial development in the unforeseen future.

Mr. C. T. Walley, a consulting engineer called by the river board, said he was unable to recommend the building of a dam at Craig Dinas.

Mr. Rowntree and Mr. Walley left for talks to seek agreement on the main points at issue. Subsequently it was stated on behalf of the river board that if there was no reasonable possibility of safeguarding the interests of local farmers and fishermen, then the river board accepted that those amenities must be sacrificed. The county council was now at a crucial stage of negotiation with the company and it was essential that faith should be maintained in the judgment of all concerned.

The enquiry was closed.

Record Outputs of Ammonia and Methanol

OUTPUTS of ammonia and methanol last year reached record levels said Dr. P. G. Harvey, works manager of I.C.I.'s Dowlais factory at a recent meeting of Dowlais Works Council, of which he is chairman. Production of these products was up by 3.8% over the 1957 total. This was achieved by an increase in running time from 94.2% to 96.1% and by higher output efficiency.

Among major projects now in hand at Dowlais, Dr. Harvey referred to the construction of a coke recovery plant and connection of factory drains to the town sewer. A heavy maintenance programme for 1959 will include a total shut-down in April that was postponed from 1958.

I.C.I. and Bayer Buy Norwegian Patents

Imperial Chemical Industries Ltd. and Farbenfabriken Bayer have bought licences and patent rights from the Norwegian firm Sunde Fabrikk, Spjelkavik, for 500,000 kroner (£25,000) each. The deal is for a new process for manufacturing foam plastics insulation of water pipes. In addition, the contract comprises royalties and manufacturing machinery.

SIMON-CARVES PROCESS CUTS-OUT SULPHUR DIOXIDE EMISSIONS

APRACTICAL and economical process for cutting-out sulphur dioxide emissions from large industrial boiler installations and recovering ammonium sulphate and sulphur in saleable qualities was described recently by Mr. T. Kennaway, director of research, Simon-Carves Ltd., Cheadle Heath. He was giving a paper at a conference on technical aspects of the Clean Air Act held in London recently by the Royal Society for the Promotion of Health (see also p. 328).

Economics of the Simon-Carves process depended on the percentage of sulphur in the fuel. A recent estimate and cost balance sheet for a plant capable of treating gases from four boilers, each burning about 400 tons of oil a day containing 3½% sulphur, had shown that a very substantial profit could be made per ton of oil burned. The point at which the process would begin to show a profit was somewhere between 1½ and 2% of sulphur in the fuel; it should certainly be an attractive proposition where large quantities of high sulphur fuel were being burned.

Mr. Kennaway's estimates were based on experience gained with a pilot plant which had been operating at a Nottingham power station since March 1957. It handled the flue-gases produced in the combustion of 120 tons of coal a day.

The process consists essentially of

scrubbing the flue gases with ammonia liquor to produce a solution of ammonium salts which by autoclaving are then converted into grade 1 ammonium sulphate and high purity sulphur, both saleable products. As a result of further development work, which is continuing in conjunction with the Central Electricity Generating Board, it is now possible to make the whole process a continuous one and to raise the present scrubbing efficiency of 94% by two-stage washing.

Mr. Kennaway said that all other flue gas washing processes previously used made very heavy losses because they did not produce saleable products.

Mr. Kennaway stated that synthetic ammonia liquor could be used to supplement existing supplies; that would, however, reduce the profit shown by the process.

He added that the only alternative to gas washing—the dispersion of hot flue gases from tall chimneys—could not be accepted as a satisfactory solution to the problem. Apart from the fact that valuable sulphur was lost it was impossible to predict accurately the ground-level concentration of pollutants from any chimney, however tall. He would not like to see the problem neglected merely because it was not possible yet to deal with sulphur emission from small domestic and industrial fires.

U.K. Scheme for Notifying Hazardous Chemicals is Unique, says Dr. Turtle

ONE-HUNDRED members and guests attended a dinner of the Pesticides and Surface Activity Groups, Society of Chemical Industry, held in the Windsor Castle, London S.W.1, on Monday. Dr. E. E. Turtle, Pesticides Group chairman, and senior chemist at the M.A.F.F. Infestation Control Division, Hook Rise, Tolworth, presided. The dinner followed a joint meeting of the two groups at S.C.I. headquarters in Belgrave Square when Dr. G. Hartley gave a paper on 'The role of surface active substances in the application of pesticides'.

Proposing the toast of 'The Surface Activity Group', Sir Robert Robinson, O.M., S.C.I. president, spoke of the recent formation of the group. He said that a panel of a group became a separate S.C.I. group when it could work by itself. He wished every success to the group which had arisen from a panel formed within the S.C.I. Oils and Fats Group; it covered a very important range of industrial activity.

Sir Eric Rideal, group chairman, responded to the toast and proposed the toast of 'The Pesticides Group'. There was little doubt, he declared, that the livelihood of the ordinary man-in-the-street depended increasingly on the activities of the Pesticides Group.

Responding, Dr. Turtle said that the panel of the Agricultural Group which

was the precursor of the Pesticides Group was formed 10 years ago. During that period it had served both its members and the general public, particularly so far as 'hazardous chemicals' were concerned.

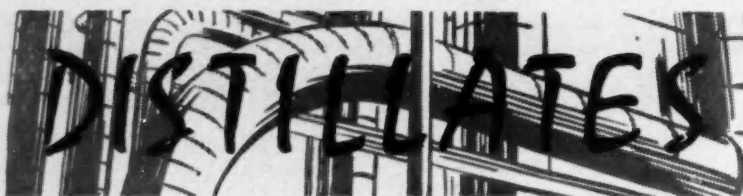
He described as unique in the western world the scheme of notification of hazardous pesticides which was done voluntarily by manufacturers themselves. In some countries, this was taken as yet another example of British idiocy because they had rigid schemes enforced on their industries. He was sure that the activities of the group had played a large part in the good working of the scheme.

Despite all the difficulties, he added, there seemed to be no slackening in the production of new pesticides.

Toast of 'The Guests' was proposed by Dr. F. P. Coyne, vice-chairman of the Pesticides Group, and responded to by Professor N. K. Adam.

No Change in Method of Charging Alkyd Resin Duty

The Government, having considered all the circumstances involved, have rejected the application made in 1957 for a change in the method of charging import duty on solutions of alkyd resins, whether modified or not, in hydrocarbon oil.



★ RECENTLY I.C.I. Plastics Division carried out proving trials for what may be a daily air service linking division headquarters with factories in the North-East and North-West. There is a continual interchange of visits between senior staff and technologists and the scheme should save both time and money.

Starting at Hatfield, for the Welwyn Garden City H.Q., the route is by way of Middleton (for Billingham and Wilton) and Square's Gate Airfield, Blackpool (for Hillhouse and Darwen) and then back to Hatfield. The round trip takes just over four hours, including stops. The aircraft being used for the trial is a four-engine Heron which has room for 14 passengers and 700 lb. of freight.

On the first day, the trial flight was bedevilled by engine trouble which delayed take-off, while on the second day Hatfield was fogbound and the aircraft was grounded.

★ NEWS of a versatile desiccant, Hi-drite, newly introduced in the U.K. (see p. 320), reminds me that a well-known form of anhydrous calcium sulphate, anhydrite, has a variety of industrial uses.

Its very stability, however, is evidence of its lack of susceptibility to hydration. The existence of a substance of the same chemical composition but with a very high reactivity to water (sometimes called 'soluble anhydrite') has long been known; but the precise nature of its structure and action were until recently not understood. This has delayed the development of anhydrous calcium sulphate as a commercial desiccant, and it was not until the early 1930s that W. R. Hammond, who made the first systematic investigations, was able to exploit it in the U.S.

Preparation of a really active form of the compound has been found to depend upon very careful selection of the raw material, and upon the precise determination and control of the conditions (which are themselves conditioned by the starting material) of the activating process. In this country the problem has been complicated by the lack of suitable raw materials. After much research, the Hi-drite process has been developed which is suitable for the activation of a raw material available in the U.K.

★ FIRST of the certificates under the commendable apprenticeship training scheme for qualified chemical operators initiated by employers and unions in 1953 will be awarded shortly.

The scheme differs in two important ways from the traditional apprenticeship—there is no age limit and before qualifying, the apprentice has to pass an examination set by the City of London Guilds and complete a planned programme of practical training.

Designed to meet the post-war need of the chemical industry for a new type of operator with theoretical as well as practical training to handle the industry's complex new plants, the scheme is administered by a special committee in the Manchester and Salford area. Mr. G. F. Clayton, chairman of the committee, will present the first certificates at Ashburton Chemical Works, Tenax Road, Trafford Park (one of the Geigy Group) on 20 February.

Recipients are Mr. W. Roberts promoted to a staff position with Hardman and Holden Ltd. in December 1957 and now foreman of the contact acid plant on which he started work in 1957; Mr. J. Astin, chargehand on Hardman and Holden's insoluble sulphur plant when invited to take the course, and later a shift foreman on the carbon bisulphide plant (he has since been accepted for a position with the A.E.A.); and Mr. F. Whelan, promoted chargehand on process work with the pharmaceutical section of Ashburton Chemical Works in 1955, a post he has held ever since.

★ IN THE 10 January issue of CHEMICAL AGE I mentioned the possibility that Calico Printers' Association's case for the extension of its Terylene patents would be heard in public. I now learn that the hearing has been fixed for the 25 February at the Patent Office. Opposing the application are British Celanese and it is likely that the case will last at least several days. It is expected, however, that it will be heard in private since as present advised the Comptroller has no discretion to admit the press or public.

A decision is not expected to be given until some time after the hearing and then either side has the right to appeal to the Patents Appeal Tribunal. It could still be several months before the application is finally settled. In the meantime, the two patents in question, although they expired in June last, remain in force.

★ NEARLY six miles of what is thought to be the widest and thickest rubber-coated Terylene conveyor belting ever made, some of it in widths over 6 ft. and 1 in. thick, is now being installed in a large ore field in the Soviet Union. The belting was designed by B.T.R. Industries Ltd., while John

Bright and Brothers wove the special heavy fabric from 376,000 lb.—2,810,000 miles—of Terylene yarn supplied by I.C.I.

B.T.R. won the contract against stiff world competition and completed the contract within three months. Terylene was chosen because it was the only fibre combining outstanding strength, whether wet or dry, with flexibility and resistance to impact stretching and rot.

The belting comprises from between eight and 14 plies of Terylene fabric with skim coats between plies. Both the widest—78½ in., 14-ply belting—and the narrower widths remain supple and 'tough' readily under their own weight.

★ NEWS reaching me from the U.S. on Tuesday shows that president of the Manufacturing Chemists' Association, John G. Hull, has recently written to Senator J. W. Fulbright emphasising that the sale of chemical know-how to the U.S.S.R. would be giving away America's technical time lead. Savings in man-hours accruing to the Russians from such sales could be applied by them, he states, to other aspects of scientific progress, including military projects.

Hull quotes these examples of time gains that the U.S.S.R. could realise: A U.S. producer of nylon, polythene and polyurethane spent more than 2,100 man-years to develop these products; commercial production of butyl rubber cost a U.S. producer 1,100 man-years; polythene development and plant expansion cost another U.S. producer 2,200 man-years.

★ A REFERENCE that I saw this week to a new Stationery Office publication—'Industrial Disputes Tribunal Award 1180—Rates of wages in the heavy chemical, fertiliser and plastics industries'—puzzled me. Had my watchful colleagues failed to notice a major tussle on wages?

This White Paper, cost 8d, deals with the deliberations of the Industrial Disputes Tribunal on two points that were not resolved when wage rates were laid down last September: (a) should women workers get a farthing an hour more than was offered? and (b) should workers in the plastics sector get ½d less than other workers because of difficulties in the industry?

Honours were divided. The fair sex did not even get a brass farthing; but plastics workers did not lose their ½d.

★ THE last has yet to be heard of the D.S.I.R. decision to disband the N.C.L. Microbiology Group. At the last meeting of the Parliamentary and Scientific Committee, Mr. D. J. B. Copp and Mr. Stanley Mayne spoke of the dissatisfaction felt by biologists in the U.K. at the ruling. The subject is to be included on the agenda for the next meeting of the steering committee.

Alembic

HYDROGEN-FLUORINE MIGHT BE ROCKET PROPELLANT OF FUTURE

ROCKET propellants, or oxidants, made necessary because rocket motors are independent of the atmosphere, might be mono- or bipropellants, solid or liquid, self-igniting or non-self-igniting—the design of the motor varying accordingly. As a result there was a very wide range of use for the rocket, particularly in cases of concentrated energy for short periods.

This was stated by Professor A. D. Baxter (De Havilland Engine Co. Ltd.) at a meeting of the Yorkshire Section, Institute of Fuel, held recently in Leeds, when he spoke on 'Rocket fuels'.

Rate of supply and storage space of rocket propellants (depending largely on specific consumption and propellant density) were limiting factors. Specific consumption was very high in rockets as the oxidant was included as well as the fuel and thrust per unit weight of propellant was relatively small due to the high jet velocity.

Specific impulse or jet velocity, however, was taken as the main criterion of rocket performance. The jet velocity increased with pressure ratio (but there were only small gains in having it greater than 20 to 1), temperature (practically up to 3,000°K), and inversely with the molecular weight of the exhaust gases. The fuel mixture ratio was thus adjusted to give the maximum jet velocity which occurred with a fuel-rich flame.

Bipropellants Preferred

In discussing comparative performance (judged on exhaust jet velocity), Professor Baxter said that bipropellants were generally better than monopropellants. The oxidants nitric acid, hydrogen peroxide, oxygen, ozone and fluorine, usually gave an increasing exhaust jet velocity in that order with a given fuel, of which hydrogen was theoretically the best; but the choice of propellant might depend on engineering or other limitations.

Solid and liquid monopropellants had roughly similar performances, but the liquids required a relatively large combustion chamber. There were three main classes of solid monopropellant—cordite, plastic (which had the advantage that it did not crack), and pressed charges (of low performance). All these had the advantage of relatively high density, so reducing storage space and atmospheric drag.

Some solid fuels, for example, beryllium, with liquid oxidants had theoretical advantages, but were very difficult to handle.

One important factor was that the motor wall temperature must not exceed about 900°C. Liquid propellants were therefore used as external coolants.

The best practical propellants at the moment were based on liquid oxygen with hydrogen rich fuels giving exhaust

jet velocities of about 800 ft./sec. In future, about 12,000 ft./sec. might be obtained using hydrogen-fluorine propellants, but that was about the limit of normal, conventional, chemical fuels.

A basic equation of rocketry was:

$$V = v \log_e (M/m)$$

where:

V is rocket velocity when all the fuel is burnt.

v is the exhaust jet velocity.

M is the rocket mass at take off.

m is the rocket mass when all the fuel is burnt.

The distance a rocket will travel varied as V^2 and hence, with present day pro-

pellants, the M/m ratio was the limitation on long flights. This could be improved by 'staging'; that is, firing a large rocket carrying a smaller one, jettisoning after using all the propellant, then firing the smaller rocket. This, in turn, could be jettisoned if it carried a still smaller rocket.

Theoretically, improved propellants could be based on the reactions of stored free radicals (hydrogen atom recombination would give an exhaust jet velocity of about 56,000 ft./sec.) or a nuclear reactor heating an inert fluid (at 4,000°K, water would give 12,000 ft./sec. and hydrogen 35,000 ft./sec.).

As an illustration of the use of rockets, Professor Baxter showed and commented on a short film entitled 'Power from Peroxide' which was largely a discussion of the testing of the hydrogen peroxide powered De Havilland Spectre rocket engine.

'Quasi-science' Has Been Bête-noir of Cosmetic Chemistry—Dr. Marriott

MORE than 200 members of the Society of Cosmetic Chemists of Great Britain attended the annual dinner and dance held in London on 6 February. The function was the ninth of its type, although the society has been in being for 11 years.

Proposing the toast of 'The Guests' Dr. R. H. Marriott, president of the society, said this year would be one of "intense activity". He was referring to the congress on cosmetic science to be held in London in April, which will cover the whole field of cosmetic science.

At the 1957 meeting held in Paris, said Dr. Marriott, a resolution had been taken to co-ordinate all societies of cosmetic chemists and an International Federation had been formed. The British society is already affiliated with the Society of Cosmetic Chemists of America.

Since the Bonn conference last autumn, the Belgian society had decided to reform. 'Quasi-science', Dr. Marriott emphasised, had been the 'bête noir' of cosmetic science. There was now a desire for cosmetic science to become more academic.

At the forthcoming London congress cosmetic chemists are expected from West Germany, Belgium, Holland, France, Norway, Eire and the U.S.

Mr. Frank Schon, chairman of Marchon Products Ltd., the chief guest, replied for the guests and proposed the

toast to the society. He said that his association with the society was limited, but he felt that its objects were very laudable indeed. There was a great need for dissemination of information on cosmetic chemistry and for an improved status of the chemists and technicians associated with the industry.

Co-operation with the U.S. society and with the other societies of Europe was seen by Mr. Schon as being of great value to the U.K. as a whole. The cosmetic chemistry industry had shown phenomenal growth in the last 10 to 15 years. He thought that while this reflected the rise in the standard of living, it also reflected the high quality of the products produced, and the high standards of the technicians who manufactured them. In the U.S. the cosmetic industry was selling more *per capita*, that was, more than twice as much as in this country or in Europe. The quality in this country was equal to that of the U.S. The industry here could, still, however, double its sales.

With the U.S.S.R. so much in the news, Mr. Schon thought that the cosmetic chemists would be interested to learn that during his recent visit behind the Curtain, he had learned that the Soviet was interested in soap, cosmetic and toiletries industries and that the proposed seven-year plan for consumer goods, embraced these industries.

L. to r. at the annual dinner of the Society of Cosmetic Chemists: Dr. R. H. Marriott, president, Mrs. Marriott, Mrs. Schon and Mr. Frank Schon, chairman of Marchon Products Ltd., and chief guest



HI-DRITE, VERSATILE NEW DESICCANT NOW AVAILABLE

DESCRIBED as an all-purpose desiccant, Hi-Drite, marketed by Hi-Drite Ltd., 245 Knightsbridge, London S.W.7, is composed of almost pure anhydrous calcium sulphate, chemically activated under carefully controlled conditions.

Various grades are available to suit particular applications. Grade I is at present available in the following forms: powder form, recommended for removing small quantities of water (less than 1%) from organic liquids, separation being effected by decantation or filtration; 5-mesh granules, stated to be suitable for drying organic liquids in either the liquid or the vapour phase, and for drying gases; 10-mesh size, for use in small units, U-tubes, etc., and for drying gases; $\frac{1}{8}$ inch granules, for use in desiccators, compartment dryers, drying cabinets and for drying air and other gases in large towers and columns; and $\frac{1}{2}$ -in. pellets specially prepared (B.P. 768,158) in order to provide a desiccant in a highly compacted form having a bulk density of 70 lb. per cu. ft., uniform in shape for packing drying columns and towers. These pellets contain approximately 1% of an organic lubricant of the glycol type which is soluble in water and in organic solvents. They are therefore unsuitable for solvent drying. Moisture absorption capacity towards gases is unaffected, but the rate of absorption is slightly reduced.

Moulded shapes can also be 'tailor-made' to suit special requirements.

Drying Efficiency

In drying efficiency Hi-Drite is reported to be between phosphorus pentoxide and concentrated sulphuric acid. Moisture remaining in air after drying with the preparation is 0.005 mg. per litre. (1 lb. of Hi-Drite will dry 110 cubic feet of air from an initial condition of 50% R.H. at 20°C). Efficiency is high up to 100°C, but falls off slowly with increasing temperature. Capacity of grade I in pellet or granular form is at least 6% under conditions of relative humidity less than 50% and up to 20% under conditions approaching saturation.

It is stated that this desiccant may be used in direct contact with organic liquids. Limiting capacity is approximately 6.0% of its weight of water. Liquids boiling below 90°C may be distilled directly from Hi-Drite. Hydrophobic liquids, such as benzene and other hydrocarbons, should be treated with the preparation at room temperature, before distillation.

Introduction of the desiccant into the reaction vessel itself is stated to result in remarkable improvements in yield. Thus in the preparation of sulphate esters of carbohydrates, using chlorosulphonic acid as sulphating agent in a pyridine-chloroform solvent:

Carbohydrate	Product	Usual Yield	Yield using Hi-Drite
D-glucose	D-glucose-C-sulphate	56%	72%
1, 2, 3, 4-Tetraacetyl β -D-glucose	1, 2, 3, 4-Tetraacetyl β -D-glucose-6-sulphate	40%	80%
N-acetyl galactosamine	Mixed ester sulphates of N-acetyl galactosamine	58%	72%

The preparation can be completely regenerated repeatedly by heating for 4

hours at 150°C. It should not be heated at temperatures exceeding 250°C, since its activity may be permanently impaired. In the course of development are two variants of normal Hi-Drite; a high-capacity grade, and an indicating grade which will give a visible sign of its exhaustion.

Prices of Hi-Drite are as follows: Grade 1 powder, 10 mesh, 5 mesh aug 3 in. granules, bottles 1 lb. 5s per lb.; drums (price per lb.) 7 lb. 4s, 14 lb. 3s 6d, 28 lb. 3s 4d, 56 lb. 3s 2d, and 112 lb. 3s. Pellets are charged at an extra 6d per lb. on above prices. Cartage is charged on all consignments under 112 lb.

Fisons Introduce Simazine-based Systemic Weedkiller, Weedex

AS a result of collaboration of Fisons Pest Control Ltd. with J. R. Geigy, Basle, Switzerland, to market pesticides on a world-wide scale, Fisons now announce the introduction of Weedex, described as a 'total weedkiller'.

Weedex contains 50% simazine (2-chloro-4,6-bis(ethylamino)-S-triazine) discovered by Geigy's Dr. Hans Gysin, and an inert filler. The performance of simazine as a weedkiller has been fully evaluated at Fisons' Chesterford Park, and has been given large-scale trials all over Great Britain on a variety of soils and under many different weather conditions.

Advantages of Weedex in the control of weeds are: its low water solubility (only 5 p.p.m.) so that when applied to soil it remains in the surface layers for long periods (up to a year); its mode of action (the preparation is absorbed by the roots of weeds and carried to all parts of the plant); a wide range of effectiveness against many varieties of weeds; safety in handling since Weedex has been found to have negligible toxicity

to humans, animals and fish owing to its low solubility; it is also non-inflammable; it is stable and non-corrosive and so can be used near equipment on railway lines, etc.

Weedex is available as a wettable powder of small particle size, which readily suspends in water. The amount of water is not critical but should be sufficient to give even coverage of the soil surface—at least 100 gall. an acre. It is best applied in early spring when growth is about to start, but can be used throughout the growing season. One application will control weeds for 12 months.

Dosage rates of 30 lb. an acre on light soils and 40 lb. on heavy will control weeds under many different conditions. For annual weeds only, rates are from 20 to 30 lb. and for purely preventive control after treatment in the previous year rates of 10 to 25 lb. are effective.

Prices are: 5 lb. packs, 40s per lb.; 56 lb. kegs, 34s per lb., with reductions for larger quantities.

Hilger and Watts Develop Synthetic Crystals for Gamma Radiation Detection

CRYSTALS used as phosphors for the detection and measurement of gamma radiation and as optical materials have been developed by Hilger and Watts Ltd., 98 St. Pancras Way, London N.W.1, and are the subject of a new booklet.

The need for optical materials suitable for use in different ranges of the infra-red spectrum stimulated the development of methods for growing large single crystals of alkali halides. After much experiment, the process was developed to a stage where sodium chloride crystals about 8 in. in diameter and 4 in. thick could be produced of a purity and crystalline perfection superior to that of natural material, and similar crystals could be grown of many other materials not occurring naturally or found only in very small pieces.

More recently demands have arisen for other artificial crystals, notably for

use as phosphors for the detection and measurement of gamma radiation, and the techniques have been applied to the production of such crystals. Other materials of more academic interest have also been grown on an experimental scale.

Crystals which have been grown experimentally or commercially include NaCl, KCl, KBr, CsBr, KI, TiCl₃, AgCl, NaNO₂, NaI(Tl), CsI, CsI(Tl).

Sodium iodide with added thallium iodide is one of the most important phosphors used for detecting and measuring gamma radiation. It is grown in large crystals, and cylinders up to 4 in. in diameter by 3 in. thick can be supplied. Larger material is grown but, owing to the fact that flaws often occur during growing, firm delivery dates cannot be given for greater sizes.

FERTILISER SOCIETY HEARS REPORT OF WORK ON MECHANISM OF GRANULE FORMATION

ALTHOUGH operation of granulation, of importance in the fertilizer industry, is familiar it is not a simple matter to explain why a moist powder when vibrated on a plane surface or made to travel through an inclined rotating drum should under suitable conditions automatically form spherical granules of approximately uniform size. Also, it is not clear why such granules should, in the moist state, have appreciable mechanical strength and a density comparable with that produced on the same material by an applied pressure of many tons per square inch.

Professor D. M. Newitt and Dr. A. L. Papadopoulos at the meeting of the Fertiliser Society held in London last week, reported that they had been studying the mechanism of granulation of insoluble materials and of the effects on granule strength of soluble additions. They have tried to relate mechanical strength of moist granules with the packing characteristics of the feed material and with the cohesive forces present in the initial stages of granulation and after drying. Work was done on redistribution of solute when a granule composed of both soluble and insoluble material is dried. The granulator employed consisted of a drum 18 in. in diameter and 10 in. deep, constructed of aluminium and mounted to rotate about a horizontal axis at a uniform known speed.

Granule Formation

Granule formation and growth. The formation of granules requires the presence of cohesive forces which owe their origin to the surface tension of the liquid and capillary action of the particle assemblies. When the granules are dried another set of forces due to adhesion of solute material deposited between insoluble particles comes into play. Both, state Newitt and Papadopoulos, are important in the granulation of fertilisers.

With regard to distribution of moisture in a granule composed of a large number of spherical particles of approximately uniform size, three separate conditions may be distinguished. When moisture content is low, moisture will collect at the points of contact between the particles in the form of discrete lens-shaped drops with concave free surfaces (pendular state). Surface tension forces holding the particles together have been found to be quite considerable. When the pores of the granule are full, the state is known as the capillary state. Any removal of water from a saturated granule produces a curvature of the water surface in the interstices of the surface layer of particles and will set up suction potential. This is a measure of the resultant forces tending to hold the particles together and hence of the mechanical strength of the granule.

There is an intermediate condition

known as the funicular state in which capillary forces are operative although the pores of the granule are not fully saturated.

With formation of pendular bonds granules grow by adhesion of individual moist particles, but have little mechanical strength. If capillary forces are operative two granules can coalesce and by the rolling action of the granulation, form a mechanically strong spherical granule.

The suction potential, and hence granule strength can be measured experimentally or for particles of uniform size may be calculated from the relation

$$Pe = x \frac{I-E}{E} T \dots \dots \dots (1)$$

where x is a dimensionless factor depending upon type of particles, T is the surface tension of the liquid in the granules, E is the porosity of the granules and r is a linear dimension representing size of the particles.

From equation 1, it was evident, stated the authors, that the strength of a granule would depend *inter alia* upon the surface tension of the liquid component.

Optimum moisture content. Critical moisture content will vary with the porosity of the granule. Examination of the variation of strength of granules made of fine sand and water, with moisture content, has indicated the importance of ascertaining and employing the optimum moisture content in granulating operations. The effect of other variables such as drum loading, rate of revolution and residence time on the granule strength are also of importance.

Effect of solutes on granulation. When the binding liquid of a granule contains solids in solution the strength of the moist granule will be modified by any change in the surface tension due to the solute. In the case of nitrogen-phosphorus-potassium (NPK) fertiliser the change is unlikely to be large.

Drying Rate Examined

Examination of rate of drying of a granule (composed of mixed fine silt and water) has shown that in the initial stages of drying, the rate remains substantially independent of moisture content. At a certain critical moisture content, the rate diminishes rapidly with decreasing moisture content until a second critical is reached. The rate diminishes as drying proceeds until equilibrium moisture content is reached.

The drying rate curve, Newitt and Papadopoulos report, can be interpreted in the light of what is known as the capillary theory of drying. Interpretation of this curve provides a clue to the effects produced on granules by the presence of solutes. Thus, during the period when liquid is moving to the surface of the granule and evaporating the solute will

be deposited at or near the surface. When the average moisture content falls below the second critical point liquid movement ceases and remaining solute will be uniformly distributed in the interior of the granule. Such a granule would not have a homogeneous structure.

Examination of salt distribution in a granule moistened with a saturated solution and dried at 118°C has shown that most of the salt accumulates in the outer layers of the granule and that distribution in the core is relatively uniform. More even distribution of salt is necessary if greater strength were required. There are practical difficulties in obtaining an even distribution, but of several methods examined by Newitt and Papadopoulos, one is stated to show prospects of success.

If a granule is dried to a moisture content corresponding with the second critical point on the curve and drying is arrested the salt deposited in the outer layers of the granule will re-dissolve and slowly diffuse back into the interior. When diffusion ceases and drying is resumed the salt will then be deposited *in situ*.

Strength Measurements

Measurements of strength were carried out on granules having a 2.5% average salt content. Results have shown that as the salt in the core is increased by 44% the strength of the dry granules increases 12-fold and that it is at a maximum when the salt concentration gradient is a minimum.

Dry granules having 2.5% average salt content were found to be three times as strong as granules having 5% average salt content. A considerable economy in binder could be obtained by more uniform distribution, it is stated.

Strength of granules during drying. When the water contains a salt in solution adhesion due to salt deposition more than compensates for the reduction in capillary forces which diminish during drying, and as soon as the surface of a granule begins to dry its strength increases rapidly. This increase is more marked at temperatures higher than the boiling point of the solution, and is due to changes in the salt distribution and in the structure of the hard outer shell. Additional factors contributing to the strength are the structure and composition of the outer shell.

It has been found experimentally by Newitt and his co-worker that rapid drying produces a homogeneous layer of fine salt crystals and sand, bonded together, while slow drying produces large crystals which grow between the sand particles and force them apart.

Salt content and granule strength. Experiments have been carried out using sodium chloride, ammonium sulphate and potassium nitrate. For granules composed of ammonium sulphate and sand the strength of dry granule increases from 0 to 25 lb./sq. in. as the salt content increases to 10%. The whole of the salt is found deposited in the granule which has a hard outer shell and a soft but uniform core. Strength increases as salt and sand fuse together throughout the granule. A maximum value is reached at

about 80% salt content. It has also been observed that the strength of dry granules varies with the salt used. In granules containing small quantities of salt, the strength increases in the order, sodium chloride, ammonium sulphate, potassium nitrate. As the salt content increases, however, the solubility becomes effective and for 80% and upwards salt content the order is ammonium sulphate, potassium nitrate and sodium chloride. There are two factors which may determine the strength of the composite granule, namely, the adhesion be-

tween the salt crystals and the sand and the strength of the salt crystals themselves.

The results obtained, stated Professor Newitt and Dr. Papadopoulos, although directly applicable to simple cases of granulation, did not cover all the factors involved in complicated systems such as mixed fertilisers in which preferential crystallisation could occur with segregation of individual solute components. They hope to extend the work to deal with the incidence of segregation and the phenomenon of caking.

Prof. Ubbelohde Discusses Melting Mechanisms of Ionic Crystals

SPEAKING on the 'Melting mechanisms of ionic crystals' at the joint meeting at Battersea College of Technology of the London Section, Royal Institute of Chemistry, and the college chemical society recently, Professor A. R. Ubbelohde, of Imperial College, London, said he proposed to discuss the correlation of structure changes, during the melting process, with thermodynamic parameters.

Two principal factors were involved in the fundamental melting equation. These were the entropy and fractional volume changes. Disorder was always increased on melting. The volume change also was usually an increase since randomisation of position in a close packed lattice would hardly occur without volume increase. Open structures were rare and the melting process with contraction was thus rare. The open tetrahedral structure of ice afforded an example. Clues as to the mechanism of melting could often be obtained from a study of premelting phenomena—the slow changes in variation of crystal properties occurring over a temperature range extending below the melting point, before the discontinuous change at that point.

The principal ways in which the

entropy of a crystal increases were reviewed by the professor. Changes in vibrational and in orientational entropies might contribute to the total change and change in positional entropy always did so. In the case of flexible molecules configurational changes might be important and, finally, with the possibility of complex ion formation on passing to the disordered liquid, there were associational entropy changes to be considered.

In connection with positional randomisation the concept of similitude was discussed. From the simplest viewpoint similar positional entropy changes would be expected for substances with the same crystal structure. Again this concept should apply to the fractional volume increase. The professor said some support for the concept was drawn from data for several series of halides, but its limitations were evident and were discussed.

Associational entropy was of great importance in the low melting class of ionic crystals. The low melting salts frequently had an anion which was far from spherical and known readily to form complex ions from work in aqueous solution. Evidence about complex formation in the melts was being obtained by a variety of techniques.

Dr. Aiken on Increasing Importance of EDTA Group in Industrial Usage

AAVAILABLE chelating agents were reviewed by Dr. J. K. Aiken at a meeting of the London Section, R.I.C., held at Northampton College of Advanced Technology, London E.C.1. In particular, Dr. Aiken devoted considerable time to the EDTA (ethylene diamine tetra-acetic acid) group. He commenced with a summary of the preparative methods and properties of EDTA, and its precursor 'Trilon A'. The molecular structure was illustrated by a series of colour slides.

The increasing importance of the EDTA group in industrial usage was then explained. Mention was made of its use in the stabilisation of such metal sensitive chemicals as ascorbic acid and soap which are readily oxidised in the presence of traces of copper; in cleaning

and clarifying solutions; as a reservoir of available metals in electroplating and agriculture; as a water softener and chelating agent in textile dyeing and pharmacologically as an antidote to chronic lead poisoning. Examples of the use of EDTA in antibiotic production, preparation of cathode ray tubes, photographic developers, synthetic rubbers and rust removers were also given.

Dr. Aiken closed his lecture with a review of the uses of EDTA in rare earth separation as an eluting agent from ion exchange resins; in the study of enzyme systems; he mentioned the search for a suitable chelating agent which would chelate strontium in preference to calcium and its possible pharmacological application in dealing with ⁹⁰Sr from radioactive fallout.

Association of Consulting Scientists Formed

THE Association of Consulting Scientists has been formed as a clearing bureau for inquiries for independent scientific services. Membership embraces independent whole-time consulting scientists in the U.K. in all fields of science and technology other than medicine and civil, mechanical and electrical engineering. The founding members are mostly chemists and biologists, but physics and other sciences are expected to be represented.

At a meeting in London last spring under the chairmanship of the late Sir Hugh Watts, it was decided to explore the possibilities of such an association and at a more recent meeting inauguration was formally completed.

Discussion at the meetings was particularly concerned with the present inadequate appreciation and utilisation in the U.K. and overseas of existing research and other facilities available from independent British consulting scientists and research institutes.

The new association will operate in close collaboration with the Royal Institute of Chemistry, and other professional institutes and with other organisations concerned with the co-ordination of British efforts in research, production and marketing.

Officers are: chairman: Dr. J. G. Davis, Ph.D., D.Sc., F.R.I.C., M.I.Biol.; hon. treasurer: Dr. G. W. Ferguson, B.Sc., Ph.D., F.R.I.C.; hon. secretary: Mr. W. H. Stevens, A.R.C.Sc., F.R.I.C., F.P.I., F.I.R.I., 15 Hawthorne Road, Bromley, Kent

Committee Protest Against Duty on Light Oils

Mr. F. J. Erroll, M.P., Economic Secretary to the Treasury, received a deputation from the Industrial Light Oils Committee, led by Mr. Norman J. Campbell, chairman, on 10 February.

The deputation handed to Mr. Erroll, for transmission to the Chancellor of the Exchequer, their case for the repeal of the 2s 6d a gall. duty on light hydrocarbon oils used for industrial processes. They compared the rate of hydrocarbon oil duty, which at 2s 6d a gall. is 125% of the value of the oil, with the maximum purchase tax rate of 60%. They also referred to the implications of a possible free trade area.

Lecture by Acheson Research Manager

One of the special lectures in the series 'Friction and Lubrication' arranged by the Department of Mechanical Engineering, Borough Polytechnic, will be given by Mr. E. R. Braithwaite, research and development manager, Acheson Colloids Ltd., P.O. Box 12, Prince Rock, Plymouth, on 28 February. He will deal with the surface chemical aspects of dry lubrication, molybdenum disulphide and other solid lubricants, wear of impregnated bearings, research and future trends.

FLUOROACETAMIDE SUGGESTED AS CONTACT INSECTICIDE

FOLLOWING the finding by W. A. L. David and B. O. C. Gardiner that some compounds related to fluoroacetamide showed systemic insecticidal, it was determined by A. N. Worden and M. A. Phillips that fluoroacetamide itself was a very active systemic aphicide and miticide at very high dilutions; for example, rose and bean aphids are killed (100%) by dilutions as low as 1 in 50,000 parts of water. As animal toxicity was shown to be very low, it was believed that fluoroacetamide was a very effective and cheap systemic insecticide, with advantages over the phosphorus systemic insecticides.

It was in 1956 that Tritox, a formulation containing fluoroacetamide as well as acetamide, was marketed as a general aphicide for use on non-edible plants. In the three seasons of its free sale, Tritox (which can be sold freely without restriction since it has been exempted from control by the Poisons Board) has proved an effective insecticide against aphid pests of rose plants, winter carnation, and a very large number of other ornamental and flowering plants, while at the same time its practical toxicity to mammals and man has not been found to be high.

Against Sugar Beet Aphids

Further developments have included the use of fluoroacetamide formulations against aphids of sugar beet. Experiments under the auspices of the Felsted branch of the British Sugar Corporation Ltd., by courtesy of Mr. Lloyd Jones and Dr. Raymond Hull, on experimental sugar beet plots at Dunholme and more recently at Swaffham, have indicated that a formulation of fluoroacetamide suitable for use against aphid pests of edible plants, Megatox is both a cheap and effective systemic insecticide for this purpose. Megatox has also received clearance for use on sugar beet by the Ministry of Agriculture.

Dr. M. A. Phillips (Associated Fumigators Ltd.) points out that fluoroacetamide is not only a systemic insecticide, but also a contact insecticide. It will kill most insects with which it comes into direct contact and it also has fumigant properties. In practice it has been observed that if an infested plant, such as a sugar beet, is sprayed with Megatox any insects receiving the spray are doomed; those which may be protected from the direct spray are killed a little later on by the insecticide which has entered the sap either from the root via the soil, or from the foliage via the spray.

Investigations are continuing on the value of fluoroacetamide preparations against aphids of other edible plants such as beans, cabbage, sprouts and other brassicae, apples, pears, blackcurrant and other fruit crops and a considerable amount of evidence has now been accu-

mulated indicating the effectiveness of this new systemic insecticide. Examination of residues of fluoroacetamide in plants such as the above has shown that the pattern is much the same as for sugar beet; that is, the plant gets rid of all fluoroacetamide within a matter of 4 to 6 weeks. The plants seem to be protected, however, against further in-

festation for a somewhat longer period.

Long-term feeding experiments with animals having diets containing very high additions of fluoroacetamide have shown, Dr. Phillips reports, that the substance has justified the original estimate of its relatively low animal toxicity. Further research is being carried out on antidotes. There are in hand a number of interesting developments in this field and it is believed that there is some justification for believing that the results may include other useful systemic insecticides and fungicides chemically derived from fluoroacetamide.

Outstanding Adhesion Claimed for B.R.P.'s Non-drying Plasticising Alkyd

A NEW non-drying plasticising alkyd based on mixed fatty acids, having a high degree of saturation and said to confer outstanding adhesion, has been introduced by British Resin Products Ltd., Devonshire House, Piccadilly, London W.1, under the trade name Epok A.243/50.

Epok A.243/50 is available both in solvent-free form and as a 50% solution in xylol. The resin is used with amine resins to give stoving finishes with excellent gloss, colour retention, flexibility and chemical resistance. Typical applications include refrigerator enamels, automobile finishes and furniture lacquers.

This new alkyd will tolerate dilution with aromatic hydrocarbons, ketones and esters, it is reported, but it is insoluble in aliphatic hydrocarbons and alcohols. With amino resins such as Epok U 900 (an etherified urea resin) and Epok U 9190 (a melamine resin), maleic resins, some alkyd resins (such as a dehydrated castor oil glycerol esterified alkyd resin) and nitrocellulose, Epok A.243/50 is compatible but is not compatible with ethyl cellulose, polyvinyl butyral,

chlorinated rubber and drying oil alkyls.

Pigmentation is stated to present no problems since the wetting characteristics of the resin are very good. Good dispersion of pigment can be obtained by the conventional ball-milling technique. Dispersion of difficult pigments such as blacks is found to be assisted by the incorporation of a small quantity (2%) of soya lecithin, based on the pigment, added as a solution in xylol.

Best results using Epok A.243/50 with amino resins for stoving finishes are obtained by stoving for approximately 30 minutes at 120°C (248°F). Quicker stoving can be achieved by increasing the temperature.

Specification		Limits
Test		
Sp. gravity (solution form) ...	50%	0.990—1.000
Viscosity at 25°C (77°F) ...	50%	28—33 poises
Solubility in xylol ...		48.5—51.5%
Solids content ...		15—20 mg. KOH/g.
Acid value of solid resin ...		approx. 43%
Phthalic anhydride content ...		

Typical formulations with Epok A.243/50 are given in Information Sheet No. 515 issued by British Resin Products Information Department.

New Windscale Reactor to Complement A.G.R.

A NEW low-power research reactor is to be built at Windscale, now being expanded as one of the national centres for the development of gas cooled reactors. The new reactor will be known as HERO (hot experimental reactor of O, zero, power). It will cost about £1½ million and will be built near the advanced gas cooled reactor (A.G.R.) on which work has already started. Its function will be to complement the work of A.G.R. by making it possible to carry out low radiation level measurements and to experiment with several alternative arrangements of fuel to obtain the best results.

It will be completed early in 1961 and will be operated and studied by physicists of the Research and Development Branch at the Windscale laboratories.

HERO, which will generate a few kilowatts of heat, will consist initially of a graphite structure 19 ft. in diameter and 19 ft. high but an important feature is that it will be possible to dismantle it and rebuild it in a variety of ways. The graphite core will be contained in

a steel vessel connected to a pipe circuit with pumps and heaters so that it can be operated at high temperature in carbon dioxide. It will, in fact, be the reverse of the A.G.R. since the carbon dioxide gas will supply heat to the core instead of removing heat from it. The fuel will consist as in A.G.R. of clusters of pencil-like rods of uranium oxide sealed into beryllium cans, and these will be arranged in channels in the graphite on a regular lattice.

Yorkshire Potash Will Not Be Mined

In reply to an inquiry by the Teesside Industrial Development Board, Imperial Chemical Industries Ltd., and Fisons Ltd. have indicated that there is no likelihood of potash deposits in Eskdale (Yorks) being worked in the foreseeable future. Some years ago, the companies proved the existence of potash at a depth of 4,000 ft., but it was stated that the deposits could only be worked satisfactorily by deep-mining.

In Parliament

'DUTY WILL NOT STOP SILICONE DUMPING'

THE 4s duty imposed on imported silicones will be quite ineffective to prevent dumping from France, Mr. H. R. Gower, M.P. for Barry, stated in the House of Commons.

Mr. Gower asked the President of the Board of Trade on 10 February what evidence he had regarding the effectiveness of the duty, which he imposed under the Anti-Dumping (No. 1) order in January 1958, in giving protection to the British silicone industry against the material injury which they were suffering by reason of this dumping, and what further action he proposed to take.

Mr. J. Rodgers, Parliamentary Secretary to the Board of Trade, replied: The effectiveness of this duty is kept under regular review.

Mr. Gower: As this is the only anti-dumping order yet introduced and as this duty will be quite ineffective to meet the dumping of protected French silicones, will my hon. friend look at this matter and reconsider whether the duty should be increased?

Mr. Rodgers: If the Board of Trade were to take any specific action either to increase, reduce or remove the duty, I think the hon. gentleman would agree that it would be improper to give any prior notification of that action because it would have the obvious risk of forestalling or withholding supplies from the market in anticipation of a change.

M.P. Criticises Cost of Mecamylamine Hydrochloride

Mr. M. Edelman (Lab., Coventry, N.) asked the Minister of Health whether he would make enquiries as to the charge made by a U.S. company's subsidiary

operating in the U.K. of 40s per 100 10-m.g. tablets of mecamylamine hydrochloride, a drug on current supply to the N.H.S., in view of the fact that that material was available in Europe at £100 per kilo and that the N.H.S. profit on the price, after allowing for manufacturing costs, was about 990%.

The Minister, Mr. Derek Walker-Smith, said the drug was classified as a new drug of proved value not yet standard, and its price was therefore not regulated at present by the scheme agreed with the pharmaceutical industry. He did not know how Mr. Edelman had made his calculation, but if the details could be provided he would make some enquiries of the manufacturers.

Reducing CO Content of Town Gas

The gas industry is working on the development of catalytic processes to reduce the carbon monoxide content of existing town gas, said Mr. Reginald Maudling, Paymaster General, in reply to a question on 13 February. Work is also being carried out on new gasification processes that will produce town gas with little or no CO.

Increasing Production of Gas from Oil

The gas industry estimates that its consumption of tail gas and other refinery surpluses may rise, in terms of coal equivalent, from the present level of about 500,000 tons to 2 million tons in 1965, stated Sir Ian Horobin, Parliamentary Secretary to the Ministry of Power, in the Commons recently.

D.S.I.R. Takes Over Tropical Products Institute as a Research Station

THE Tropical Products Institute in London, previously controlled by the Colonial Office, is to become one of the research stations of the Department of Scientific and Industrial Research.

Responsibility for the institute will pass from the Colonial Secretary to the Lord President of the Council on 1 April.

The basic reason for this development is to be found in the changing shape and nature of the Commonwealth. Countries which have recently achieved independence, and thus no longer come within the scope of the Colonial Office, may still wish to avail themselves of the services of the institute. In these circumstances it is more appropriate that the institute should come under the control of the D.S.I.R., whose Minister, the Lord President, has wider responsibilities for research in the civilian field.

Support will continue to be provided to the institute by the Colonial Office, from the Colonial Development and Wel-

fare Funds, for work of primary interest to, and benefit to, the colonies.

The main objective of the Tropical Products Institute will continue to be that of improving the economic viability of the underdeveloped territories of the tropics, primarily those that form part of the Commonwealth. The aim is to improve the technology of industries that already exist and to introduce new industries as a result of research into new uses for tropical plant and animal products (including waste products of existing industries). Particular attention will be directed to the needs for diversification in those territories which have a one-crop economy.

There will be no change in the direction or staff of the institute. Steps had already been taken to double the staff to carry out the programme begun when the laboratories were moved from the Imperial Institute to Gray's Inn Road last year.

No Change in Wholesale Prices of Chemicals

THE Board of Trade's wholesale price index, now based on the new Standard Industrial Classification, shows that the January figure for both total and home trade sales of chemicals remained the same as in the previous month; both figures were slightly below the level of January 1958. The following extract from the index is based on output in 1954 = 100:

	Jan. 1959	Dec. 1958	Jan. 1958
<i>Commodities Produced in the U.K.</i>			
<i>Chemical and allied industries:</i>			
Total sales ...	104.8*	104.8*	105.7
Home market sales ...	105.9*	105.9*	106.5
General chemicals ...	106.5*	106.9	108.6
Pharmaceutical chemicals ...	82.4*	82.1	84.9
Pharmaceutical preparations ...	101.1	101.4	103.7
Soap ...	126.6	125.7	119.0
Soapsless detergents ...	104.4*	103.8	102.8
Synthetic resins and plastics materials ...	91.0*	9.16	94.6
<i>Commodities Wholly or Partly Imported</i>			
Pyrites, c.i.f., U.K. ports ...	78.2	75.1	84.7
Sulphur, crude (for acid making), c.i.f. ...	78.3	8.0	85.5
* Provisional.			

Monsanto Marketing New Packaging Film

POLYFLEX 150, a transparent polystyrene packaging film is the latest addition to the Polyflex range manufactured by the Plax Corporation in the United States and marketed in Britain by Monsanto Chemicals Ltd., 10-18 Victoria Street, London S.W.1.

The film is produced in gauges of 0.001, 0.00125, 0.0015 and 0.002 in. and in roll widths ranging from 2½ in. to 42 in. by increments of one-sixteenth of an inch. It is flat, non-curling and wrinkle-free.

Odourless, tasteless and non-toxic the film has low moisture-vapour and gas transmission rates. It is claimed that it has a shelf life unequalled by other plastics films. Envelope and carton windows can be made from the film, which can be printed by any process and sealed with adhesives or impulse-type heat-sealing equipment.

Evans Medical and Burma

Management of Burma Pharmaceutical Industry has been taken over by the Burmese Government from Evans Medical Supplies Ltd., of Speke, Liverpool. The plant was built at a cost of £5 million in 1953 and has been managed since that date by the Evans group on behalf of the Burmese Government. Expiration of the contract was not originally due until next year.

It is understood that Evans Medical have now received formal notification of the Burmese action.

Nobel Withdraw Notices

Notices given to 50 employees of Ardeer factories, Stevenston, have been withdrawn because of a sudden change in the order position, states the Nobel Division of I.C.I.

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I—Basic Chemicals: Appreciable Progress in Calcium Carbide Noted

IN the inorganic chemical sector, the O.E.E.C. report* briefly surveys developments in soda ash, caustic soda, chlorine, sulphuric acid and calcium carbide.

Soda ash. Output of soda ash in the U.K. was 10% lower in the first half of 1958 than in the same period of 1957. Austrian production has increased (production index 127 as against 117) and also Italian (111 against 110). Production in the Netherlands only started in December 1957. By comparison U.S. production is estimated at 4,223,000 metric tons in 1957, compared with 4,538,000 in 1956.

Caustic soda. Production of caustic soda by the electrolyte process is stimulated by the expansion in chlorine production, whereas the output of soda obtained by caustification from soda ash is more stable and has even declined somewhat in certain countries. U.K. production is stated to be 18% lower in the first half of 1958 compared with the same period in 1957. U.S. production is assessed at 3,920,000 metric tons, of which 3,610,000 tons are obtained by electrolysis and 310,000 tons by caustification. 1956 figures were 3,829,000 metric tons, of which 3,446,000 tons were electrolytic soda and 383,000 caustification soda.

Progress in Chlorine

Chlorine. The activity noted in 1958 in this industry is due to the growing demand in user industries, and especially the chemical industry itself, e.g., for p.v.c., chlorinated solvents, bleaching, etc. U.K. chlorine production in the first half of 1958 declined by 3% compared with the first half of 1957. In the U.S. chlorine production was estimated at 3,448,000 metric tons in 1957 as compared with 3,557,000 in 1956.

Calcium carbide. Appreciable progress in the calcium carbide industry is noted in the large countries: 9% in Western Germany, 6% in the U.K., and 7% in France. Improvement is mainly due to increased demand from producers of acetylene derivatives. In the U.S. sales in 1957 amounted to 923,000 metric tons as against 930,000 in 1956.

Sulphuric acid. Output of sulphuric acid in 1957 for all O.E.E.C. countries increased at a slower rate than in previous years: 3.4% as compared with 5.5% in 1956 and 6.5% in 1955. Little change in chamber acid activity is noted but production of contact acid is increasing at a slightly faster rate. Although sulphuric acid is still principally obtained

from pyrites, sulphur is becoming an increasingly important raw material.

Carbon black. Output in France started at the end of 1957 and amounted to 1,200 tons, and 8,500 tons for the first six months of 1958. Germany produced 51,600 tons of gas black in 1957 (41,100 tons in 1956) and flame black 16,300 tons (16,000 tons). In the first quarter of 1958, production was 12,900 tons and 3,900 tons respectively.

U.K. production rose from 83,200 metric tons in 1956 to 106,000 metric tons in 1957 and in the first six months of 1958 was 59,000 metric tons, a 19% increase over the first six months of 1957. Over 95% of carbon black is based on petroleum. Production in the U.S. amounted to 816,900 metric tons (654,200 tons 'furnace' grade and 162,700 tons 'contact' grade). A reduction on 1956 output which was 834,800 tons (669,900 tons 'furnace' grade and 164,900 tons 'contact' grade). Extensions to 42 existing plants increased production capacity by 61,000 tons a year. Consumption increased by 2% over 1956. Natural gas and liquid hydrocarbons were used to make carbon black.

Inorganic chemicals trade. Imports in 1957 by O.E.E.C. countries totalled 16% as against 18% last year. Exports were 14%, as against 15% last year. Italy, the Netherlands and Norway, imported appreciably more inorganics (+28%, +118%, and +40% respectively). Overall exports increased by 1%—considerable increases being recorded by W. Germany and the Netherlands (+13% and +16% respectively).

Activity in organic chemicals. Benzene consumption increased by 20% in 1957 over 1956 in Belgium, France, Italy, Norway and Sweden. Consumption of acetylene rose by 15% and naphthalene consumption by 8%.

Organics accounted for 18% of O.E.E.C. countries' total imports of chemical products and 14% of their total exports, compared with 17% and 14% respectively in 1956.

Imports of organic chemicals at \$339 million in 1957, increased by 13% on 1956. Imports from the dollar area increased by 32% and 28% of the total imports came from this area last year. German imports in particular rose from \$11.4 million in 1956 to \$21.2 million in 1957.

Production and Consumption of Sulphuric Acid (in '000 tons of 100% acid)

Country	1956	1957	1956	1957
	Pro- duction	Con- sumption	Pro- duction	Con- sumption
Austria ...	74	88	80	99
B.L.E.U. ...	1,116	957	1,073	931
Denmark ...	188	188	191	194
France ...	1,535	1,556	1,600	1,633
Germany ...	2,530	2,642	2,723	2,852
Greece ...	88	89	106	106
Ireland ...	65	65	65	65
Italy ...	2,043	2,031	2,055	2,036
Netherlands ...	690	720	700	720
Norway ...	97	90	91	102
Portugal ...	268	268	245	245
Sweden ...	397	387	394	364
Switzerland ...	128	120	125	118
Turkey ...	22	47	22	47
U.K. ...	2,287	2,286	2,373	2,409
O.E.E.C. Total ...	11,528	11,534	11,843	11,921
Spain ...	940	940	960	960
U.S. ...	14,371	14,353	15,428	15,451

Calcium Carbide Production (in '000 metric tons of CaC₂)

Country	1956	1957	1st Half 1958
France ...	265	283	161
Germany ...	881	960	478
Italy ...	260	248	n.a.
Netherlands ...	38	44	n.a.
Norway* ...	44	57	n.a.
Portugal ...	5	4	n.a.
Sweden ...	75	81	n.a.
U.K. ...	133	142	75

n.a.—not available.
* (excluding CaC₂ for making cyanamide and dicyandiamide).

Chlorine Production (in '000 metric tons)

Country	1956	1957	1st Half 1958
Denmark ...	2	4	n.a.
France ...	183	211	122
Germany ...	462	520	262
Italy ...	127	149	n.a.
Norway ...	32	30	n.a.
Portugal ...	—	1	n.a.
Sweden ...	96	107	n.a.

n.a.—not available.

2—Sulphur Materials: West Europe Production Increased by 2%

SULPHUR materials in 1957 are again the subject of a survey by O.E.E.C. in their report. Western Europe's production of native sulphur increased by 2% in that year compared with an average decline of 6% in the two previous years. (In the U.S. output fell by 14% but Mexican production increased by about a third to reach over 1 million tons. Output of recovered sulphur rose by 8% both in O.E.E.C. countries and the U.S. Sulphur recovery in the U.K. declined by a quarter.

Consumption of sulphur in O.E.E.C.

countries (excluding Germany) rose more rapidly in 1957 than in 1956. In the Netherlands consumption rose from 10,000 tons in 1956 to 34,000 tons in 1957. Consumption in B.L.E.U. and France rose 31% and 22% respectively.

Total consumption in all O.E.E.C. countries was 1,305,000 metric tons. Exports to non-member countries totalled 137,800 m. tons and production amounted to 934,800 m. tons. Italian consumption plus exports of sulphur are recorded as having considerably exceeded production

* Report, 5th Year, Chemical Products Committee, O.E.E.C., available H.M.S.O., price 15s. (See also CHEMICAL AGE, 14 February, pp. 275 and 277).

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(by 75,000 tons in 1957; and in 1956 by 58,000 tons).

Consumption of sulphur for manufacture of sulphuric acid is increasing constantly. The tonnage used in B.L.E.U. and the Netherlands for acid making rose and in France, there was a 43% increase. (In the U.S., the O.E.E.C. report notes, three-quarters of the sulphur used was for acid making, and two-thirds of acid produced was made from sulphur compared with 20% in Western Europe).

Production of sulphur from pyrites remained stable in 1957 but consumption fell, due to the increased use of sulphur as such for acid manufacture. Pyrites consumption declined most in B.L.E.U. (34%) and the Netherlands (13%). Imports were 9% lower in 1957 than 1956 and exports (except from Cyprus) fell by 8%. W. European exports of pyrites to other countries rose by a fifth.

Trade and production in zinc blends was stable in 1957 but consumption fell by 7%. O.E.E.C. countries including Western Germany used 5,110,000 tons of sulphur in all forms in 1957, and exported 300,000 tons. Production amounted to 3,135,000 tons, leaving a net deficit of 2,275,000 tons. Imports from overseas territories and non-member countries totalled 2,310,000 tons.

The O.E.E.C. committee remarks on the growing preference of acid makers for sulphur as such for sulphuric acid manufacture instead of other sulphur materials. With the sulphur from Lacq natural gas, "there seems to be no reason to expect an adverse change in the situation, which with falling prices and freight rates, is very favourable to the sulphur consumer".

3—Fertilisers: Rising Consumption May Not Keep Pace with Growing Nitrogen Surplus

GENERALLY, supply continued to expand, as well as demand, both on home and foreign markets. Exports of nitrogenous, potash and phosphate fertilisers to non-member countries rose in 1957-1958. The O.E.E.C. report expresses doubts, however, as to whether in the nitrogen sector the appreciable expansion will keep pace with the growing surplus of production over international demand.

Nitrogen. Output of nitrogen rose by 13% to reach 3.89 million tons in 1957-58. Production of nitrogenous fertilisers rose by 13.7% to reach 3.44 million tons. The greatest expansion took place in the output of urea (+41%) and nitrogen used in complex fertilisers (+20%).

Technical nitrogen production amounted to about 450,000 tons and accounted for 12% of total production in 1957-58. Total nitrogen production is expected to increase by 14% in 1958-59 and 8% in 1959-60. Capacity at July 1958 amounted to 4.5 million tons, an increase of 10%

Production of Sulphur in O.E.E.C. (In '000 metric tons)

	1955	1956	1957
Nature sulphur ...	200	190	194
Increase or decrease compared with previous year (%) ...	-7	-5	+2
Recovered sulphur ...	274	292	314
Increase compared with previous year (%) ...	+1	+7	+8

Consumption of Sulphur in O.E.E.C.

	1955	1956	1957
In '000 metric tons ...	985	1,065	1,187
Difference as % of previous year ...	—	+8	+11
Difference as % of consumption in 1949-50 ...	—	+8	+21

Pattern of Consumption of Sulphur in O.E.E.C. Countries* (as a percentage)

	1955	1956	1957
Sulphuric acid ...	43.4	44.8	49.0
SO ₂ ...	15.2	16.2	14.7
CS ₂ ...	18.8	18.0	17.1
Agriculture ...	13.4	11.8	10.9
Other uses ...	9.2	9.2	8.3

* (Excluding W. Germany, Ireland, Portugal and Turkey.)

Pyrites Production (in '000 metric tons S content)

	1955	1956	1957
O.E.E.C. countries ...	1,852	1,944	1,961
Cyprus ...	469	527	482
	2,321	2,471	2,443

% increase against previous year's output (O.E.E.C. countries only) ...	9	5	1
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Pyrites Consumption

	1955	1956	1957
'000 metric tons S content ...	2,200	2,257	2,128
Increase or decrease as % over previous year's consumption ...	—	+3	-6

production in 1957-58 compared with 42% in 1956-57.

In 1958-59 and 1959-60 world production is expected to rise by 13% and 7% respectively or in both years by 1% less than the forecast increase for O.E.E.C. countries. Production in the U.S., the world's largest producer is likely to remain stable, it is reported, at about 2.9 million tons. Some 80% of synthetic nitrogen capacity is being used at the present time.

Rapid expansion in Asia is expected in the next two years. Compared with 1.16 million tons in 1957-58, output in 1959-60 is estimated to reach 1.86 million tons, an increase of 60%. Japan accounted for three-quarters of the total in 1957-58, but while output in that country is expected to rise, the Japanese share in total Asian production will fall in future, it is stated, as new plants come into operation in other Asian countries, and in India particularly.

Indications of Slow-down

There are indications, states the O.E.E.C. report, that expansion of world nitrogen capacity is now slowing down. About 500,000 tons of new capacity is expected to come into operation in 1958-59, and rather more than 200,000 tons in 1959-60. Over the same period nitrogen capacity in the U.S.S.R. and other East European countries will probably rise by about 200,000 tons annually.

Imports by O.E.E.C. countries from non-member countries are recorded as being relatively stable at about 55,000 tons. Exports from the O.E.E.C. area rose to these countries by about 40% in 1951-58 to amount to over one million tons.

The volume of intra-European trade in nitrogen was less than a third that of exports to non-member countries; the increase over 1956-57 being much lower also (+14%). Tonnage available for export during 1958-59 and 1959-60 is expected to rise considerably.

Phosphate fertilisers. Production in 1957-58 rose by 4% to 3.28 million tons P₂O₅. There was little difference in the tonnage of single superphosphate and of basic slag produced in 1957-58. Production of single superphosphate was slightly below the previous year. Largest increases were recorded, however, for concentrated superphosphates and complex fertilisers, production in both cases rising by about 15% over the previous year. Only a negligible increase in output is expected in 1958-59.

Total production capacity, at 4.1 million tons of P₂O₅ has remained unchanged with a slight decline in capacity for production of single superphosphates. Less than 70% of total superphosphate capacity is being used by O.E.E.C. countries in general.

Consumption of phosphate fertilisers rose at the same rate as production in 1957-58 (by 4%) to reach 2.99 million tons and a further increase of about 5% is expected in 1958-59.

Exports to non-member countries of phosphate fertilisers were about 25%

since July 1957. Only minor increases in capacity are expected for 1959 and 1960.

Producers' sales of nitrogen increased by 8% in 1957-58 to 2.78 million tons. Consumption of nitrogenous fertilisers (2.38 million tons) increased less than consumption of technical nitrogen (405,000 tons) which rose by 12%. Increases in total consumption forecast for 1958-59 and 1959-60 are 7% and 4% respectively, compared with 14% and 8% for total production.

Production of fertilisers is expected to increase by 12% annually during the 4-year period from July 1956 to June 1960, and consumption by only 6.5%.

World production of nitrogen (including continental China but excluding the U.S.S.R. and other Eastern European countries which together are stated to produce 1.8 million tons) can be estimated at 8.76 million in 1957-58. Nitrogenous fertilisers accounted for 7.27 million tons, and technical nitrogen for 1.49 million tons. The O.E.E.C. countries produced 44% of world nitrogen

higher than in 1956-57, totalling about 190,000 tons P_2O_5 . Trade between member countries rose by a further 8% in 1957-58 after the 24% increase in 1956-57, and reached 420,000 tons of P_2O_5 .

Potash fertilisers. A steady rate of expansion in potash production was maintained in 1957-58. Output at 3.12 million tons of K_2O was 4% more than in the previous year. A further increase of 3% in O.E.E.C. countries' potash output is expected in 1958-59, the additional production coming almost entirely from Western Germany. Production capacity at 1 July 1958 is estimated at 3.5 million tons of K_2O , a 9% increase on capacity in the previous year.

Consumption at 2.85 million tons rose more than was expected in 1957-58, but a lower rate of expansion is forecast for 1958-59 (estimated to reach 3 million tons of K_2O in that year).

4—Petrochemicals: 32% Production Rise Expected by O.E.E.C. in 1958

TOTAL investment at 31 December 1956, in the five O.E.E.C. countries (France, Western Germany, Italy, the Netherlands and the U.K.) in which a petroleum chemicals industry existed, totalled some \$412 million (as against \$240 million at 1 July 1953). Expansion planned in terms of value of plants to come into operation over the next three years (i.e. by the end of 1959) is over \$661 million. The present O.E.E.C. survey considers the position in 1957, estimates for production in 1958 and expansion plans up to the end of 1960.

United Kingdom. The carbon content of petrochemicals produced rose from 218,000 tons in 1956 to 274,000 tons in 1957 and is expected to reach 327,000 tons in 1958. The volume of future investment in the industry is increasing; it is planned to invest \$181 million by the end of 1960 using oil as raw material, some slack wax and a certain quantity of refinery gas. Investment in 1957 rose by \$42 million to \$212 million including \$24 million for utilities and general facilities.

France. Investment in the petrochemicals industry, in terms of plants reached \$69.03 million in 1957, compared with \$50.04 million on 31 December 1956. The carbon content of petrochemicals produced rose by 60% from 50,000 tons in 1956 to 80,000 tons in 1957, and an even higher rate of increase (77%) is forecast for 1958 when output, in terms of carbon content is estimated to reach 142,000 tons.

Heavy investments are expected to be made in the French petrochemicals industry in plants, which should be operating before the end of 1960. With an anticipated investment of an additional \$211 million, the size of the industry will be quadrupled.

West Germany. A steady increase has occurred in investments in West Germany's petrochemical industry. These rose by \$40 million in 1956, and by a further \$45 million in 1957, to reach a total of \$173 million at the end of that

year. Excluding the U.S.S.R. and other Eastern European countries, world potash production is estimated to have reached 5.4 million tons in 1957-58, an 8% increase over 1956-57. World consumption is estimated at 5.7 million tons K_2O (excluding the U.S.S.R. and the Eastern European countries) a 6% increase on 1956-57. Forecasts for 1958-59 show production at 5.7 million tons and consumption at 6 million tons.

Imports of potash in 1957-58 fell slightly; 400,000 tons K_2O were imported from outside the O.E.E.C. area last year compared with intra-European trade amounting to 770,000 tons. Exports, on available information, remained stable.

Production increased by nearly 24% between 1956 and 1957 when it reached 166,000 tons (in terms of carbon content). It is expected that \$120 million will be spent on plant to come into operation before the end of 1960. The quantity of feedstock used for the industry's production is expected to treble over the next two years and the tonnage of natural and refinery gas used is expected to double between 1957 and 1960.

Italy. Investment in petrochemicals rose from \$51 million at 31 December 1956 to \$78 million at 31 December 1957. Production has increased considerably, the carbon content of petrochemicals nearly doubling between 1956 (38,000 tons) and 1957 (73,000 tons) and a further substantial increase to 130,000 tons is expected in 1958.

Plans for petrochemicals expansion are on a large scale. Under construction at the present time are new plants at Ravenna and Rho, and extensions to plants at Mantova and Porto Marghera, and a new plant at Prioli Melilli is planned. This expansion will call for an investment of \$110 million.

Netherlands. With the start-up of a plant for the manufacture of raw materials for resins, investment in the petroleum chemical industry rose from \$13 million in 1956 to \$16.5 million in 1957. Output in terms of carbon content increased from 31,400 tons in 1956 to 36,700 tons in 1957, and is expected to reach 44,700 tons in 1958. Production is expected to be double that of 1958 by the end of 1960.

Other Countries. The Belgian petrochemical plant on stream last year produced ethylene oxide and derivatives, acetone, phenol and raw materials for detergents. The Maersk refinery in Denmark is at present producing, among other products, ethylene, 4,500 tons of which are used for the manufacture of ethyl alcohol.

General petrochemical trends. Total investments in O.E.E.C. countries petrochemical plants rose 33% from \$412 mil-

lion at the end of 1956 to \$549 million at 31 December 1957. A third of this increase in investment is accounted for by extensions to four W. German plants.

Compared with 420,000 tons in 1956 the carbon content of petrochemicals produced reached 630,000 tons in 1957 and has thus trebled since 1953 when 208,000 tons of petrochemicals were produced. Feedstock consumption has shown a considerable rise. Consumption of natural gas has shown the greatest rise (from 128,000 tons in 1956 to 180,000 tons in 1957, a 41% increase). Oil consumption has risen to 1,110,000 tons (+30% over 1956) and refinery gas consumption reached a total of 924,000 compared with 787,000 tons in 1956 (+17%).

Forecast for 1958. Production of petrochemicals was expected to increase by 32% in 1958 to reach a total of 831,000 tons (carbon content). Feedstock required was estimated at 1,630,000 tons of oil, 1,085,000 tons of refinery gases and 384,000 tons of natural gas.

Future developments. Investments planned over the next two years are expected to be slightly less than previously. Some \$640 million will be spent on plant which should be in operation by 1960. The industry will then have doubled its size compared with 1957. U.S. investment in the same period is expected to increase from \$4,500 million to \$8,000 million.

Investment in O.E.E.C. countries will lead to production annually in terms of carbon content of 1,343,000 tons of petrochemicals additional to output in 1957 (630,000 tons) thus making a total of nearly 2 million.

Main features of expansion plans are synthetic rubber (nitrile as well as butyl and S.B. type), polythene, ethylene oxide derivatives and raw materials for plastics, solvents and detergents.

Professor Newitt to Advise Spanish Chemical Institute on Training of Engineers

PROFESSOR D. M. NEWITT, F.R.S., has been invited to Spain by the director of Instituto Químico de Sarria, Barcelona, to discuss the training of engineers. Professor Newitt, head of the department and Courtauld Professor of Chemical Engineering, Imperial College, will be in Spain from 23 February until 3 March.

The Instituto Químico de Sarria, Barcelona, has recently installed new plant, the first of its kind in Spain for the practical training of students in standard operations involved in the chemical industry. They asked for the services of an experienced British teacher in chemical engineering who could discuss the best ways of using the new equipment.

The British Council has made arrangements for Professor Newitt to accept the invitation. While in Spain he has been asked also to lecture at the Escuela Técnica Superior de Ingenieros Industriales and at the British Institute, Madrid.

TRADE WASTES AS SUBJECT OF MANCHESTER SYMPOSIUM

Effluent Disposal and Air Pollution

TRADE wastes in differing physical states diluted by or associated with non-injurious matter were tabulated in the introductory paper presented by Mr. H. E. Charlton at the symposium on 'Effluent disposal and air pollution' held in Manchester recently by the North-Western branch, jointly with the graduates and students section, of the Institution of Chemical Engineers.

He gave examples of methods of treatment of waste and legal aspects were given.

Mr. Charlton pointed out that acceptable standards might vary with the location of the plant and that the purification process had to deal with varying flows and varying concentrations of waste. He listed ways in which wastes could offend and the methods of treatment that were given.

As a general approach to the subject Mr. J. M. Wishart presented 'Some practical aspects of effluent treatment and disposal'. He said that it was essential to know the legal aspects of a problem and where to seek information and help. The River Board controlled discharge to a river and the Local Authority controlled effluent taken by a public sewer; therefore it was wise to approach the appropriate authority when a problem arose. An analysis of the use of water in a works would show where waste of water could be avoided and where the principal sources of pollution existed.

Simplifying the Problem

The pollution problem could sometimes be simplified by altering the process of manufacture or by re-use of purified waste water. Polluting matter and the volume of waste water should be a minimum because they took up some capacity of the sewers and of sewage plants.

A Rivers Board generally, Mr. Wishart stated, would allow the discharge of an effluent which was free from suspended solids and colloidal matter, provided the pH value was satisfactory and it contained no poisonous substances. When the effluent contained organic matter and solids in suspension, the board usually required it to be purified to a low biochemical oxygen demand and to a low suspended solids content before it was discharged to a river. The sludge so formed, often a liquid sludge, could not be discharged with the effluent. Since 1937 Local Authorities had been obliged to receive trade effluents but they wanted some pre-treatment to have been carried out to reduce volumes, acidity or alkalinity, suspended matter and other substances which might interfere with treatment at the sewage works. The design of a treatment plant for the effluent should be as simple as possible and standard equipment should be used. The plant for biological treatment was similar to that used by Local Authorities.

The cheapest possible form of treatment for trade waste was biological treatment, stated Dr. I. S. Wilson in his paper. The principles of sewage treatment were generally directly applicable to the processing of foods and natural products but chemicals introduced other factors. Dr. Wilson described the principles leading to the increase in a biological destruction of a chemical and gave a description of the effluent plant at Monsanto, Ruabon.

Describing 'The development of the Fulham-Simon-Carves flue gas washing process', Mr. C. W. Wood pointed out that the Clean Air Act of 1956 was limited to the reduction of the black smokes, but there was no legislation concerning the emission of sulphur oxides from the combustion of fuels containing sulphur although the products were very corrosive. Only a limited proportion of sulphur could be removed from coal or oil fuels and therefore the greater part of it is present in the flue gases as oxides. The Fulham-Simon-Carves process consisted of scrubbing the flue gases with an ammoniacal solution to produce a solution of ammonium sulphate, sulphite, and thiosulphate which could be converted by heat in an autoclave to ammonium sulphate and sulphur. A pilot plant was erected at a power station and it was capable of producing up to 11 tons/day and 2,000 lb./day of ammonium sulphate and sulphur respectively. The flue gases were washed with ammonia liquor in a scrubber. A portion of the liquor was removed continuously, was filtered in a plate and frame press, mixed with a solution of sulphuric acid, was heated under pressure to 150°C in a stainless steel autoclave to produce a solution of ammonium sulphate and liquid sulphur; the solution was evaporated in a stainless steel vacuum evaporator to produce a salt magma from which the salt was collected in a thickener, was centrifuged and dried. (See also p. 317 for notes on this process).

1959 Packaging Exhibition Will be The Biggest Yet

The sixth International Packaging Exhibition to be held at Olympia, London, from 8-18 September 1959, will be the biggest of the series, occupying nearly 300,000 sq. ft. Twelve overseas countries will be represented among the 300 exhibitors.

U.K. Sulphuric Acid Consumption Down by 4% Last Year

CONSUMPTION of sulphuric acid in the United Kingdom in 1958 at 2,268,197 tons fell by more than 4% compared with the 1957 figure of 2,371,060 tons. The 1958 figure, given by the National Sulphuric Acid Association, was a little higher than the 1956 total of 2,248,496 tons.

Superphosphate manufacture remained the biggest user, with 538,081 tons, or 23.72% of the whole. Titanium dioxide (322,119 tons) and sulphate of ammonia (294,302 tons) exchanged second and third places.

Figures in the following summaries exclude all government plants.

SULPHURIC ACID AND OLEUM (Tons of 100% H₂SO₄)

	Chamber & Tower only	Contact only	Chamber & Tower & Contact
Stock 1 January 1958	27,502	74,988	102,490
Production ...	482,670	1,758,476	2,241,146
Receipts ...	61,247	139,086	200,333
Oleum feed ...	—	3,724	3,724
Adjustments ...	-1,010	+575	-435
Use ...	319,154	1,063,952	1,383,106
Despatches ...	229,046	836,634	1,065,680
Stock 31 December 1958	22,209	76,263	98,472
Total capacity represented	621,840	2,186,850	2,808,690
Percentage production	77.6%	80.4%	79.8%

U.K. CONSUMPTION OF SULPHURIC ACID AND OLEUM

Trade Uses	Tons 100% H ₂ SO ₄ 1957	1958
Accumulators ...	11,128	12,015
Agricultural purposes ...	5,608	8,746
Bromine ...	12,800	12,181
Clays (Fuller's Earth, etc.) ...	9,670	10,357
Copper pickling ...	2,846	2,144
Dealers ...	11,964	11,235
Dichromate and chromic acid ...	19,738	18,168
Drugs and fine chemicals ...	19,098	18,899
Dyestuffs and intermediates ...	66,852	75,460
Explosives ...	15,237	11,404
Export ...	5,212	3,199
Glue, gelatine and size ...	516	505
Hydrochloric acid ...	58,195	52,858
Hydrofluoric acid ...	10,702	10,731
Iron pickling (including tin plate) ...	124,478	112,651
Leather ...	5,177	4,578
Lithopone ...	14,620	11,727
Metal extraction ...	3,396	2,660
Oil refining and petroleum products (vegetable) ...	60,733	55,542*
Oils (vegetable) ...	18,101	10,983
Paper, etc. ...	5,592	5,572*
Phosphates (industrial) ...	643	403
Plastics, not otherwise classified ...	35,088	40,938
Rayon and transparent paper ...	278,610	240,165
Sewage ...	10,229	10,166
Soap, glycerin and detergents ...	98,589	117,907
Sugar refining ...	701	686
Sulphate of ammonia ...	317,310	294,302
Sulphates of copper, nickel, etc. ...	24,767	15,424
Sulphate of magnesium ...	1,257	140
Superphosphates ...	543,578	538,081
Tar and benzole ...	30,275	30,899
Textile uses ...	14,952	10,679
Titanium dioxide ...	314,306	322,119
Unclassified ...	209,092	194,673
Total ...	2,371,060	2,268,197

RAW MATERIALS (Tons)

	Pyrites	Spent Oxide	Imported	Sulphur Recovered, H ₂ S and Filter Cake	Zinc Concentrates	Anhydrite
Stock 1st. January 1958	239,243	111,972	74,689	10,795	116,590	16,669
Receipts ...	279,166	244,265	282,743	39,910	126,505	745,973
Adjustments ...	-2,549	+335	+131	+641	+1,983	-2,437
Use ...	327,692	242,674	277,625	44,752	152,217	749,045
Despatches*	7,025	16,383	4,228	257	632	—
Stock 31 December 1958	186,241	97,515	75,710	6,337	92,229	11,160

* Including uses for purposes other than sulphuric acid manufacture.

Overseas News

DU PONT WILL START ORLON PRODUCTION IN HOLLAND LATE IN 1961

A NEW multi-million dollar plant for Orlon acrylic fibre is to be built at Dordrecht, the Netherlands, by E. I. Du Pont de Nemours and Co., U.S. The 40-acre plant site at Dordrecht is in South Holland, about 12 miles from Rotterdam.

The plant, to be operated by a Du Pont subsidiary that will be formed shortly in the Netherlands, will produce Orlon staple and tow mainly for customers in Europe, including the U.K. It will have a capacity of approximately 15 million lb. a year. Arthur H. Geil will be transferred from Du Pont, Wilmington, Delaware, to be managing director of the new company.

Construction work will begin later this year, and start-up of operations is scheduled for the last quarter of 1961. Operation of the plant will provide work for about 400 men and women. With the exception of a number of supervisory and technical personnel, all hiring for both construction and operations will be done in the Netherlands.

This plant is the third new manufacturing facility in Europe announced by the Du Pont company. A paint plant is being built in Malines, Belgium, and construction of a neoprene synthetic rubber plant near Londonderry, Northern Ireland, is well under way with operations due to start in 1960.

Mr. Geil states that Du Pont are building this first man-made textile fibres plant in the Common Market area to fill the fast-growing needs of all Europe. The European economic community is the largest single market outside the U.S., and this new plant emphasises the company's faith in the future economic progress of this important area.

Germans to Build Indian Chemical Plant

Negotiations are taking place between the Indian Government and Western Germany for the erection of India's first large-scale plant for the production of chemical intermediates. Cost will be between DM 100 million and DM 150 million (about £8,334,000-£12,500,000). Financing would be from West German sources and from the pre-war credit in India of the I.G. Farben concern.

The intermediates will be manufactured and sold by a nationalised concern, to be set up, but the further processing into finished products will be in private hands.

Polythene Plant to be Built in Sicily

A.B.C.D. are scheduled to start, late in the current year, the production of polythene resins at their new plant in Ragusa, Sicily. The method will be polymerisa-

tion at high pressure and the initial output will reach about 12,000 tons a year. Crude oil obtained locally will be subjected to cracking and large quantities of ethylene as well as important by-products will be obtained. Some of the output will be exported.

Oil Pipeline between U.S.S.R. and Czechoslovakia

Planning work on the erection of a direct mineral oil pipeline linking the Soviet Union and Czechoslovakia has been started. Work will begin on the laying of the pipeline in 1960. The first 500 km. (312 miles) of the pipeline, between the Czech-Russian border and the Czech town of Pressburg, will come into operation on 1 January, 1962.

U.S. Industrial Waste Meeting

The 14th Purdue industrial waste conference will be held on 5, 6 and 7 May, in the Memorial Union Building, Purdue University, Lafayette, Ind., U.S. About 50 papers will be presented on industrial wastes and their treatment. Registration forms are available from Professor D. E. Bloodgood, Purdue University.

Magnesite Plant for Austria

The Radenthein, Carinthia, firm of Oesterreichische-Amerikanische Magnesit AG are to build a magnesite-processing plant at Hochfilzen, Austria, at a cost of 750 million schillings (about £9,375,000). Raw magnesite will be mined at a point three miles from the plant and transported by cable railway.

Plant for Detergents Raw Materials

Berol AB, Gothenburg, a subsidiary of Moench Domsjö AB, have acquired a site of 400,000 square metres at Stenungsund for a plant employing 150 workers in the production of raw materials for synthetic detergents and emulsifiers.

Chemical Production in East Germany

Figures issued in East Berlin show the following monthly average figures for chemical production in East Germany:

Commodity	Unit	1950	1957	1958 (Jan.-Oct.)
Sulphuric acid	1,000 tonnes SO ₂	20.4	43.5	45.1
Nitrogen fertiliser	1,000 tonnes N	19.3	25.5	26.6
Synthetic rubber	Tonnes	3,317	6,190	6,976
Cellulose material	Tonnes	6,504	9,092	9,193
Cement	1,000 tonnes	117.7	288.4	295.2

Bayer AG Develop New Polycarbonate

The Leverkusen, West Germany, firm of Farbenfabriken Bayer AG has begun production of a new plastics with what it calls outstanding qualities. The plastics is a polycarbonate and goes under the trade name of Makrolon. It can stand temperatures of up to 135°C and as low as -100°C; it is recommended for use in transparent acid accumulators, electrical housings, coverings, coil units, precision parts, toys, household equipment, gramophone records and photographic equipment.

Poland to Supply Nitrogen Plant to China

The Polish export organisation has announced that it is to supply China with the complete equipment for three nitrogen plants, costing 8 million roubles.

Japanese Firm Expects to Build Yugoslav Acetate Plant

The New Japan Nitrogeon Co. have announced that they have been approached by the Yugoslav Government, who want a foreign firm to erect an acetate plant with an initial daily production of 10 tonnes. The Government is understood to have approached German and American firms for information on the same matter, but the Japanese company say that Yugoslavia has been so pleased with a rayon works built recently by the Japanese that they will almost certainly get the contract.

Adhesives Firm for Brazil

The new company, Cibracol S.A. Companhia Industrial Brasileira de Colas, has been set up with a capital of Crs 1 million for the production of adhesives. The shareholders are Brazilian.

Soviet Research on Borides from Deoxidation

Soviet scientists L. J. Markovsky and N. K. Vekshina (Russian Journal of Applied Chemistry, 1958, 31, 1293-99), report that research has been carried out on a method whereby a mixture of metallic oxides and boron is reduced with carbon (graphite) to produce calcium, strontium, and barium borides. These borides are mixed with small quantities of carbon. This study was undertaken to determine the influence of temperature and of the composition of the basic materials used on the reaction mechanism involved in the formation of the borides.

It was found that this main reaction was hindered by various subsidiary reactions, particularly by the formation of carbides; these carbides, after further treatment with acid and water formed

organic products, the synthesis of which has not yet been exactly established. It is believed that these organic products are those produced during certain catalytic polymerisation of acetylene.

Three processes were developed at the Russian laboratory for the purification of the boride agglomerates; these showed satisfactory results when applied to the calcium- and strontium-boride agglomerates and less satisfactory results for the barium-boride agglomerate. It is believed that large quantities of elementary carbon are present in the barium boride in a form of solution.

U.S. Polythene Expansion

Monsanto Chemicals, U.S., are to increase the capacity of their Texas City plant for conventional polythene to 100 million lb. annually by autumn 1959. Present potential is 67 million lb. Although U.S. Monsanto have been operating a low-pressure polythene pilot plant, no commercial plans for this polythene have been announced.

U.S. Industrial Chemicals Co. are reported as speeding up completion of their 75 million lb. high pressure polythene plant at Houston, and it is expected that the company will announce further expansions in this field shortly.

Austrian Firm Exports 77% of Fertiliser Output

The Austrian Nitrogen Works, Linz, exported last year about 77% of the annual output of nitrogen fertiliser, totalling about 990,000 tons. An increase in the plant's capacity made it possible to keep prices competitive.

Indian Fertiliser Plant to Use Refinery Gases

A government committee has approved an £18 million plan for a fertiliser plant near Bombay, to be based on locally available refinery gases as well as fuel oil. It will have an annual capacity corresponding to 80,000 tons of fixed nitrogen.

Concerns from Italy, France and the U.S. are reported to have offered deferred payment terms.

India Raises Import Quotas on Coal-tar Dyes

Quotas of established Indian importers for coal-tar dyes and some chemicals have been increased as follows (old rate in brackets): hydrosulphite of soda, Rangolite C (sodium sulphonylate formaldehyde) or Formosul L and sodium nitrite, 33½% (25%); bleaching paste and powder, 20% (12½%); acetic acid, 25% (20%); borax, 45% (30%); dyes derived from coal-tar and coal-tar derivatives used in any dyeing processes, 20% (12½%).

Poland's p.v.c. Plant to Reach Full Capacity

First plant for polyvinyl chloride production at the Oswiecim combine in Poland is this year to reach its full capacity of 6,700 tons a year. The artificial fibre works in Gorzow are being

expanded, to allow the production of 8,500 tons of Steelon synthetic fibre. It is planned to raise Polish plastics output to 1.3 kg. per capita this year, compared with last year's figure of 0.9 kg. per capita. The greatest increase is to be in production of p.v.c.

In the Polish chemical industry generally, an increase in output of 10% is envisaged for this year. Nearly 13% of all establishments in the chemical industry will be in the Western Territories (formerly part of Germany). Investment in the chemical industry in these territories during the year will be 20% of the total.

Montecatini To Build £34 m. Petrochemical Plant

Montecatini Chemical Co. are to start construction of a £34 million petrochemical plant, probably the largest in Europe, at Brindisi very shortly. The plant, to be built in the free port area, will employ more than 2,000 people and will produce the entire range of derivatives of liquid hydrocarbons. Rome reports say one million tons of crude oil and other liquid hydrocarbons will be used annually as raw material. The purpose of the plant is to increase Italy's exports, particularly to the European Common Market.

Dow's New Technique for Anhydrous Caustic

A new technique for continuous finishing of caustic soda has been developed by Dow Chemical Co. For the past year pilot-plant studies have been carried out. It is reported that the new process will be used on a full-scale at Dow's Freeport and Midland, Michigan plant.

Technology of the process is still secret, but reports indicate that direct firing is substituted for Dowtherm heating of long-tube vertical evaporators, practised since 1946. Elimination of the Dowtherm boiler will represent a marked saving in investment as will the elimination of shell-and-tube calandria con-

struction with its thermal-expansion problems.

Another point in favour of the new process, is that to obtain high grade caustic with Dowtherm heating, temperature levels over 700°F are required, at which temperature thermal decomposition of Dowtherm begins to assume serious proportions. Previously, the deterrent to direct firing has been the danger of overheating in the event of a tube becoming plugged. Dow are believed to have successfully overcome this drawback with a reliable control or warning device.

France to Produce Moplen

Two French companies, Pechiney and the Société Normande de Matières Plastiques, have obtained a licence from Montecatini for the manufacture of their polypropylene derivative, Moplen. They are to begin construction next year of two factories to have an output in the first stage of 10,000 tons a year.

Bright Outlook Predicted for Canadian Sulphur

There are adequate markets for the expanding output of elemental sulphur from Western Canada according to Mr. F. B. Lewis, vice-president of Jefferson Lake Sulphur Co., New Orleans, U.S.

Mr. Lewis reports that marketing the expected 1965 output of 1½ million tons would be accomplished primarily in three U.S.-Canadian areas—the Pacific North West, the Rocky Mountains, and the Great Lakes—and the Far East. By that time, these four areas would require an estimated 3.8 million tons of elemental sulphur. He estimates that the consumption of elemental sulphur in Canada and the U.S. will rise from the present 5 million tons level to 7.5 million tons by 1965. To supply these and foreign markets, Lewis predicts that production from Canada, the U.S. and Mexico would reach 12 million tons in 1965, about 5 million tons greater than at present.

P.T.F.E. Bondable After Radiation Grafting

FLUOROCARBON polymers, e.g., polytetrafluoroethylene can be made bondable and dyeable with water-soluble dyes after radiation grafting, claim Radiation Applications Inc., U.S. Wetting properties of the fluorocarbon surface can be adjusted by the technique. Costs of modifying fluorocarbons using the new techniques are expected to be reduced by about 25% compared with the costs of conventional methods.

A cobalt-60 source is used to graft one of several monomers, according to properties wanted to one or both surfaces of the fluorocarbon. For commercial production a high energy electron acceleration will be used. Radiation time varies with the intensity of the source (hours with cobalt-60 and minutes with an accelerator such as a Van de Graaf).

The radiation delivered is not fierce enough to seriously alter the polymer's properties. Elongation, it is noted, is most affected decreasing from near 500% to about 200%. Tensile strength increases about 20%.

As treated the product is stable up to 130°C but turns brown at higher temperatures. Investigations are being carried out by Radiation Applications to raise the temperature limit to between 200° and 250°C. Wire covering and 2 to 4 ml. films have been treated.

The lower production costs using the new technique lie in a manufacturer being able to dye a polymer after fabricating it and so eliminating the problem of having to run a number of colours through the forming steps. P.T.F.E. at present is coloured by mixing pigment or dye with the plastics granules.

● **MR. E. G. TURNER**, chairman of Bowmans Chemicals Ltd., will retire from the board at the annual general meeting on 6 March because of pressure of work. He has been a director since 1952. **MR. J. A. E. HOWARD** will succeed him as chairman.

● **MR. H. SMITH**, M.Sc., D.I.C., joint managing director of I.C.I. General Chemicals Division,



H. Smith

CALLARD, a Paints Division managing director, has been appointed Paints Division chairman.

● **MR. S. G. GATES**, C.B.E., chairman, and **MR. P. R. SCUTT**, managing director of Tecalemit Ltd., Plymouth, will join the board of British Filters Ltd., Maidenhead, following Tecalemit's acquisition of 50% of British Filters' ordinary capital (see p. 332). **MR. T. E. WORTH**, present chairman and technical director, will continue in that capacity, together with **MR. NIGEL J. BENNETT**, who will continue as managing director.

● **MR. J. E. C. BAILEY**, C.B.E., chairman and managing director of Baird and Tatlock (London) Ltd., and Hopkin and Willams Ltd., is making a short tour of Uganda, Kenya, Northern Rhodesia, Southern Rhodesia and South Africa. He will visit the companies' branches, agents and representatives to discuss general matters relating to the export of scientific equipment and chemicals. Among them is a new branch at Ndola on the Northern Rhodesian copperbelt.

● **MR. R. W. P. HOLT**, M.I.Mech.E., director of Widnes Foundry and Engineering Co. Ltd., has retired. During his service with the company, it has developed into one of the best known manufacturers of special purpose castings for the chemical, oil, food and allied industries. The company also fabricates in mild and stainless steel large tanks and vessels, stills and retorts, fractionating columns, tubed vessels and general constructional work.

● After 43 years' service with Rhodes, Brydon and Youatt Ltd., engineers, Stockport, **MR. C. S. YOUATT** has relinquished his position as deputy chairman but continues as a director. **MR. A. H. PARKES** who has been a director of the company for over ten years and is deputy chairman and managing director of Small and Parkes Ltd., has been appointed deputy chairman. **MR. R. L. FURNIVAL** resigned on 5 January from the board of

PEOPLE in the news

the subsidiary company, Furnival and Co. Ltd. **MR. HARRY ASTON** has been elected to the board and will take up his appointment as chief engineer to both companies on 2 March.

● **MR. M. SOFFA**, A.S.M.A., general manager of Jeltek Ltd., Green Lane, Hounslow, Middlesex, manufacturers of industrial protective clothing, has been appointed to the board of directors. He will continue to act as general manager.

● **MR. RUPERT A. WITHERS**, A.C.A., has been appointed a director of Ilford Ltd. and elected deputy chairman. **MR. Withers** has also, subject to his re-election as a director at the annual general meeting, been appointed joint managing director with **MR. W. H. DIMSDALE**, M.A., with effect from 1 April.



Professor F. S. Spring, who has joined the board of Laporte Industries Ltd. (C.A., 31 January, p. 212)

● **MR. IAN W. SMITH** has been appointed to the board of the Morgan Crucible Co. Ltd.

● **MR. JOHN DAVIES**, who recently completed 51 years' service with Orrs Zinc White Ltd., Widnes, received farewell gifts at a dinner given in his honour. They were handed to him by **DR. H. MILLS**, works manager.

● **MR. O. G. WELLER**, B.Sc., A.R.C.S., D.I.C., F.R.I.C., M.I.Chem.E., took up duties on 16 February as technical executive officer of the Association of British Chemical Manufacturers, responsible for the work of chemical engineering research and advisory service committee, the instrumentation advisory service committee and the information exchange committee. For the past seven years **MR. Weller** has been technical

manager of the Uganda Development Corporation Ltd. In his new capacity he fills the vacancy caused by the death of the late **MR. TREFOR DAVIES**.

● **MR. S. W. CHEVELEY**, chairman of the I.C.I. Central Agricultural Control since 1952, is retiring at the end of March. **MR. Cheveley**, who has completed 35 years' service with the British Sulphate of Ammonia Federation, Nitram Ltd. and I.C.I., was the first secretary of Jealott's Hill Research Station. In 1941 he was appointed a director of Plant Protection Ltd. and became a director of that company in 1944. Also in 1944 he joined the boards of I.C.I.'s Central Agricultural Control and Scottish Agricultural Industries Ltd. He is succeeded as chairman by **MR. R. A. HAMILTON**, who retains his appointment as development director of I.C.I. Billingham Division.

● **DR. J. G. TATLOW**, who has been appointed to the new chair of organic chemistry at Birmingham University, was



Dr. J. G. Tatlow

a student at Birmingham under the late **Sir Norman Haworth**. After a year in Canada on the Atomic Energy project returned and became a lecturer in 1948, taking charge of the fluorine research group under the direction of **PROFESSOR STACEY**. He was appointed senior lecturer in 1956 and reader in organic chemistry in 1957. **DR. Tatlow's** research group will still be actively engaged on organic fluorine chemistry and he will continue to help **Professor Stacey** with the general organisation of undergraduate teaching.

● **SIR THOMAS BOWEN**, Bt., 37 years old, has been appointed to the newly-created post of marketing executive of the Pyrethrum Board of Kenya, following the board's decision to adopt in principle recommendations made by a U.K. firm of business consultants in respect of certain administrative arrangements and sales organisation.

Obituary

DR. GEORGE M. BENNETT, C.B., F.R.S., Government Chemist since 1945, died at Worcester Park, Surrey, on 9 February. After graduating at London University he was an exhibitioner and scholar of St. John's College, Cambridge. In the 1914 war he did research work for the Ministry of Munitions and afterwards spent several years in industry before taking up appointments at Guy's Hospital, Sheffield University and King's College, London. During the second world war, when King's College moved to Bristol he did research work there on explosives.

MR. JOSEPH WAINWRIGHT, of Cald, Wirral, a former director of Lever Bros. Port Sunlight Ltd., died on 12 February at the age of 83. He retired in 1940.

TRADE NOTES

Silastic LS-53 Cheaper

Midland Silicones Ltd. have announced a further reduction of almost 20% in the price of Silastic LS-53, a fluorinated silicone rubber able to resist temperatures from -60°C to over $+200^{\circ}\text{C}$. This is in addition to the 10% reduction last year.

Silastic LS-53 resists attack by aircraft fuels, hydraulic fuels and petroleum-based engine oils—and is said to combine the ease of fabrication of silicone rubbers with the solvent-resistance of fluorocarbon chemicals.

These price reductions follow those announced recently by Dow Corning Corporation of America, who developed and manufactured Silastic LS-53.

Prices for Silastic LS-53 are now:

1 — 9 lots — 205s per lb.
10 — 99 lots — 200s per lb.

Solid Desiccant Type Dryers

Publication No. 77 of W. C. Holmes and Co. Ltd., Turnbridge, Huddersfield, describes Holmes-Kemp dryers of the totally enclosed solid desiccant type designed to give continuous moisture extraction from air or other gases. They operate on a preset cycle, the period of drying being followed by one of heating then cooling to drive off the absorbed moisture. Twin towers enable continuous drying to be carried out, one tower always being in the process of reactivation while the other is drying. Types of dryer dealt with include both steam and electrically reactivated Holmes-Kemp Oriad dryers and the larger convection cooled dryers. A section is also devoted to prefilters.

Bisoflex Prices

Prices of the higher phthalate plasticisers of the Distillers Co. Ltd. have (as stated in 'Trade Notes', 7 February) been reduced by £8 a ton. The new prices per ton for 10-ton lots in drums are: Bisoflex 88, £221; Bisoflex 91, £211; and Bisoflex 791, £221.

Prices of dibutyl phthalate, diethyl phthalate and dimethyl phthalate have not been changed and the prices quoted in our issue of 7 February were per ton for 10-ton lots in road tank wagons and not for 10-ton lots in drums as was stated.

Monsanto's Blended Antioxidants

Two well-known antioxidants, phenyl β -naphthylamine (PBN) and N,N'-diphenyl-p-phenylene diamine (DPPD) have been blended together to give Santoflex HP, which is marketed by Monsanto Chemicals Ltd. PBN has been found to be an excellent antioxidant for rubber, conferring good resistance to heat ageing while DPPD effectively protects rubber compounds from deterioration caused by continued flexing in use. Inclusion of the blended antioxidant in a rubber compound is claimed to confer better resistance to the combined effects of heat ageing and flex cracking than the use of the same components alone. The agent is also stated to inhibit the deleterious effect of copper or manganese in a rubber compound.

Recommended dose of Santoflex H.P. is 1 p.h.r. Above this level 'blooming' is likely to occur. The preparation is not recommended for white or light coloured stocks.

Export Decontrols

Under the Export of Goods (Control) Order, 1959, which came into force on 16 February, export control is removed entirely from: cottonseed oil, virgin aluminium, mercury, nickel, silver and silver alloys, ores and concentrates of copper and molybdenum, various electronic and precision instruments, various atomic energy instruments and appliances, specified chemicals, etc.

Export control has been imposed to all destinations on: lithium compounds, various niobium alloys, nickel wire mesh, climatic conditioning chambers, high energy military fuels, certain noxious gases, nuclear reactors, ammonium perchlorate and zirconium manufacturers. The Order, S.I. 1959 No. 161, is available from H.M. Stationery Office, Kingsway, London W.C.2, price 1s 3d.

New Q.V.F. Agents

Q.V.F. Ltd., of Fenton, Stoke-on-Trent, have appointed the Corning Glassworks, Corning, New York State, as stockists and distributors for the whole of the U.S. Making the announcement, Mr. J. G. Window, sales director, said they had already shipped to America £10,000 worth of Q.V.F. industrial glassware as part of an initial order. A. F. H. Devers and Co. (Pty.) Ltd., Selby, Johannesburg, are Q.V.F. distributors in South Africa. The Sharpe Construction Co. Ltd., Montego Bay, Jamaica, have been appointed temporary agents and distributors in the British West Indies. For the Belgian Congo, Q.V.F. have appointed Armand Dutry and Co. Ltd., of 'Adeco House', Hyde Park Gate, London, also on a temporary basis.

Agreement on Components

Servomex Controls Ltd. have concluded an agreement with Feedback Ltd. whereby Servomex will manufacture and market Feedback designs. The range of equipment includes servomechanism components and assemblies as well as apparatus for servosystem analysis and demonstration.

Mr. R. C. Steel, chairman and managing director of Servomex Controls Ltd., has been elected to the board of Feedback Ltd.

Chemico's New Venturi Scrubber

Chemical Construction (G.B.) Ltd. state that completion of a licensing agreement now enables them to offer the Svenska-Flakfabriken venturi scrubber in addition to their Pease-Anthony venturi and cyclonic-type scrubbers. The S-F venturi scrubber extends the range of Chemico's equipment to cover most gas-cleaning problems that can be dealt with by wet scrubbing. Several advantages of this scrubber design are stated to have been proven among which is the removal of solids which in other gas-cleaning equipment have been found to adhere to scrubber walls. Where water supplies are limited, heavy slurries can be recircu-

lated and process materials can be recovered in a concentrated form.

Platinum Price Rises

The 'official' U.K. price of platinum has risen from £19 10s to £21 5s an ounce, Rustenburg Platinum Mines and Baker Platinum having increased their prices. This is the first advance since platinum began to fall from its level of £34 an ounce in May 1957. The change is attributed to generally improved industrial demand for platinum.

DIARY NOTES

MONDAY 23 FEBRUARY

S.C.I.—Leeds: Hotel Metropole, 7 p.m. 'Insecticide resistance', by Dr. F. R. Bradbury.
C.S.—Durham: The University, 5 p.m. 'The chemistry of insulin', by Dr. F. Sanger.

TUESDAY 24 FEBRUARY

I.C.E.—Birkenhead: Tech. Coll., 7 p.m. 'Production of whale meat extract', by Mr. D. King.
Soc. of Instr. Tech.—London: Manson House, Portland Pl., W.1, 6 p.m. Symposium on automatic weight control in industry.
S.A.C.—London: C.S. room, Burlington House, W.1, 6.30 p.m. 'The analysis of intact samples', papers by Mr. J. F. Cameron, Dr. C. E. Mellish and Dr. D. J. Ferrett.
C.S. with R.I.C.—Sheffield: The University, 7.30 p.m. 'Management and the chemist', by Mr. J. C. W. Stead.

WEDNESDAY 25 FEBRUARY

Oil and Colour Chem. Assn.—London: Manson House, Portland Pl., London, W.1, 7 p.m. 'The moisture resistance of cold-cured epoxide resin paints', by Mr. D. M. James.
Inst. Fuel.—London: Inst. Civil Engineers, Gt. George St., S.W.1, 5.30 p.m. 'Problems of air pollution in Germany', by Dr.-Ing Heinrich Lent.

THURSDAY 26 FEBRUARY

Inst. Metals—Sheffield: 2 p.m. Symposium on corrosion.

Royal Soc.—London: 4.30 p.m. 'The direct observation of anti-phase domain boundaries in the ordered copper-gold (CuAu) alloy', by Miss Ann B. Glossop and Mr. D. W. Pashley; 'The ferro-electric behaviour of potassium dihydrogen phosphate', by Mr. J. Grindlay and Mr. D. ter Haar.

B.A.C.—Liverpool: Radiant House, Bold Street, 7 p.m. 'Salaries and conditions in industry for chemists'.

C.S. with Univ. C.S.—Liverpool: The University, 5 p.m. Pedler lecture, 'Polyacetylenes', by Prof. E. R. H. Jones.

C.S.—London: Royal Institution, Albermarle St., W.1, 7.30 p.m. 'The origin of the elements', by Prof. F. Hoyle.

FRIDAY 27 FEBRUARY

Soc. Instr. Tech.—Glasgow: 425 Sauchiehall St., 7.15 p.m. 'Data handling in the process industries', by Mr. A. Parsons.

S.A.C.—Edinburgh: 22 George St., 7 p.m. 'Recent advances in the analytical chemistry of plutonium', by Mr. F. J. Woodman.

C.S. with R.I.C. and Univ. C.S.—St. Andrews: St. Salvador's Coll., 5.15 p.m. 'Molecular shapes and sizes', by Dr. L. E. Sutton.

S.C.I.—Manchester: The University, 6.30 p.m. 'New chemicals in the paper industry', by Mr. F. Bridge and Mr. J. B. Heaton.

S.C.I. with C.S. and R.I.C.—Belfast: Queen's Univ., 7.15 p.m. 'The stability of complexes in solution', by Dr. R. J. P. Williams.

'Simulant' not 'Stimulant'

In the summarised article on 'Biological fixation of nitrogen' by Dr. E. R. Roberts (see CHEMICAL AGE, 7 February, p. 243) it was stated that 'the fixation process promised to be of "quite extraordinary technological value" in that it must eventually produce stimulants that would render the maintenance of soil nitrogen and hence productivity both easier and more certain than at the present time'. The word *stimulant* should have read 'simulant'. Dr. Roberts' work aims at finding a substance that can simulate the natural process of nitrogen fixation. The use of the word 'stimulant' later on in the text is correct.

Commercial News

Beecham Group

The Beecham Group has declared a second interim dividend of 7% on account of the year ending 31 March 1959 on a capital doubled by a scrip issue and further increased by the Thomas and Evans acquisition. A similar first interim was paid on £10.2 million ordinary, excluding the new shares issued against the acquisition. The 1957-58 total dividend is equivalent to 20% on £10.2 million.

Borax Holdings

Methods developed in New Zealand of preserving timber and protecting timber and timber products against fire with boron are arousing considerable international interest, Lord Clitheroe, chairman of Borax Holdings Ltd., states in his annual review. A sodium calcium borate product marketed by the U.S. Borax and Chemical Corporation and named Fire-brake is being used for fighting forest fires. Sales of boron herbicides are increasing and interest is developing in the use of organo-boron compounds for crop protection, including fungicides, insecticides and nematocides. Lord Clitheroe states that, in addition to these new uses, well-established uses of boron are maintaining their share of sales. The board believe that the business will grow over the years and the outlook is not unfavourable. As already stated (CHEMICAL AGE, 24 January, p. 184) consolidated net profits fell from £1,881,230 to £966,075 and the deferred ordinary dividend was maintained at 84%.

Bowmans Chemicals

In his annual statement Mr. E. G. Turner, chairman, Bowmans Chemicals Ltd., says there is considerable hope that at least one new outlet will make a substantial contribution to the company's prosperity when it has been fully developed. Plant has been remodelled to produce existing products more economically. The outlook is one of quiet optimism with profits running at about the level of 1957-58. The capital expenditure required for developments now in progress demands conservation of cash resources, and, for the time being, maintenance of the existing dividend policy. As already stated (CHEMICAL AGE, 24 January, p. 184) the dividend has been maintained at 10%.

Ilford

In spite of more difficult trading conditions Ilford Ltd.'s turnover for the year ended 31 October 1958 was slightly up on the previous year, but higher costs brought the net profit down to £752,316 compared with £788,615. With a final of 11% the dividend of 16% is repeated.

Monsanto Chemical Co.

The Monsanto Chemical Co. has announced that it is expecting a turnover this year far higher than those of 1957

- Borax Chairman Reviews New Products
- 'New Sales Outlet' for Bowmans Chemicals
- U.S. Monsanto Expect Turnover to Increase
- Higher Power-Gas Profit and Special Interim

and last year. Last year a turnover of \$54,790,000 brought the profit per issued share to only \$1.55, as against one of \$1.68 per share in 1957. With the announcement that 1959 would see a better year than either of the past two, Monsanto stated that during the year a total of more than \$50 million would be invested in the U.S. and Canadian companies of the group. Last year \$42,590,000 was invested and in 1957 \$54,000,000.

Tecalemit

Tecalemit Ltd., Plymouth, have purchased half of the ordinary shares in British Filters Ltd., Maidenhead. This combination of a highly specialised research and development organisation with an experienced industrial group will, it is stated, provide an even better service for the customers of both companies.

Yorkshire Tar

A scrip issue of one £1 ordinary share and one 64% cumulative redeemable preference £1 share for each £1 ordinary stock held is proposed by Yorkshire Tar Corporation Ltd. C.I.C. consent to the issue of the redeemable preference shares has been obtained.

Power-Gas Corporation

Group trading profit and other income of the Power-Gas Corporation for the year ended 30 September was £1,380,186 (£1,052,562). Group net profit stood at

£534,601, against £358,695. In addition to maintaining the dividend at 15% with a final of 10% (same), a special interim of 5% is being paid for 1958-59. Orders booked during the year totalled £9.25 million (£12.3 million). Annual meeting will be held on 19 March at 21 Tothill Street, London S.W.1.

British Oxygen

With their 6% final dividend to make 10% for the year ended 30 September 1958, British Oxygen Co. Ltd. have declared a special 2% interim for the current financial year for profits tax reasons.

Group profits have increased by more than £2 million—from £9,181,548 to £11,319,153. Group turnover has risen by 15.7% spread over a wide range of products. This favourable situation has been realised, it is stated by chairman Mr. J. S. Hutchison, by the greater efficiency and increased output from major installations completed in recent periods.

Depreciation and tax provisions are heavier, leaving a group net profit of £3,334,062 compared with £2,748,986, of which £2,876,208 (£2,440,245) is available to the parent company.

INCREASE OF CAPITAL

L. B. HOLLIDAY AND CO. LTD., chemical colour and dyeware manufacturers, etc., Deighton, Huddersfield. Increased by £650,000 beyond the registered capital of £350,000.

Market Reports

DEMAND FOR INDUSTRIAL CHEMICALS CONTINUES

LONDON There has been no outstanding feature in the markets during the past week. Home demand for industrial chemicals has continued along steady lines and contract delivery specifications have covered good quantity. Buying interest in fertilisers has become more active.

For the most part the supply position is fairly easy, but prices are well held at recent levels, and the undertone is firm. Export trade has been reasonably good with a steady flow enquiry for a wide range of chemicals.

The position of coal tar products is more or less unchanged. Pitch and cresylic acid continue in active call.

MANCHESTER Quietly steady trading conditions have been reported during the past week on the Manchester market for chemical products. The cotton textile bleaching, dyeing and finishing trades are still calling for only moderate sup-

plies, but there is a fair contract movement to most other industrial outlets, while overseas business also continues on a fair scale. Steady to firm conditions characterise the price situation. In the market for fertilisers there is now a fair movement of the compounds and most nitrogenous materials, and a quietly steady demand is reported for the leading tar products.

GLASGOW The bulk of prices during the past week have been firm, and steady activity has been maintained in the Scottish heavy chemical market. Buying has involved the usual range of heavy chemicals, and in particular, demands for acids have been in evidence both against spot and contract requirements.

Much more interest is now being shown in agricultural chemicals, mostly in forward requirements. There is still a good volume of enquiries for the export market.

NEW PATENTS

By permission of the Controller, HM Stationery Office, the following extracts are reproduced from the 'Official Journal (Patents)', which is available from the Patent Office (Sale Branch), 25 Southampton Buildings, Chancery Lane, London W.C.2, price 3s 6d including postage; annual subscription £8 2s.

Specifications filed in connection with the acceptances in the following list will be open to public inspection on the dates shown. Opposition to the grant of a patent on any of the applications listed may be lodged by filing patents form 12 at any time within the prescribed period.

AMENDED SPECIFICATIONS

On sale 25 March

Acidic polyester-ethoxylene resinous compositions. General Electric Co. 732 253
Cooling and drying thermoplastic film. United Plastics Industries, Inc. 798 013

On Sale 2 April

Acrylic interpolymers and coating compositions containing same. Du Pont de Nemours & Co., E. I. 761 928
Oxo alcohol quality. Esso Research & Engineering Co., formerly known as Standard Oil Development Co. 764 189

ACCEPTANCES

Open to public inspection 2 April

Cyanine dyestuffs. Gevaert Photo-Produkten N.V. 811 156
Amino acid compounds and methods for producing same. Parke, Davis & Co. 811 103
Production of fuels having high octane values from hydrocarbons. Badische Anilin- & Soda-Fabrik A.G. 811 371
Malting of barley. Imperial Chemical Industries, Ltd., Brian, P. W., and Radley, M. E. 811 374
N-Acylated benzylamino phenols. Geigy A.G., J. R. 811 130
Recovery of gold from cyanide solutions. Permutit Co., Ltd. [Cognate application 24 850.] 811 378
Ignition of propellant charges. Imperial Chemical Industries, Ltd. 811 233
Manufacture of beer. Jabula Foods (Proprietary), Ltd., formerly Transvaal Organic Enterprises (Proprietary), Ltd. 811 382
Method of preparing carboxylic acid and the carboxylic acid resulting from said method. Johnson & Son, Inc., S. C. 811 131
Manufacture of dyestuffs of the thiazole and oxazole series. Farbenfabriken Bayer A.G. 811 386
Quaternary salts. Smith, Ltd., T. & H., Johnston, R. G., and Spencer, K. E. V. 811 132
Gas Filters. Elliots (Newark), Ltd., and McGlooin, W. F. [Cognate application 14 157.] 811 186
Phthalocyanine acid amides and process for their manufacture. Farbenfabriken Bayer A.G. 811 221
Water-insoluble azophthalocyanine dyestuffs and process for their production. Farbenfabriken Bayer A.G. 811 222
Purification of esters of hecogenin. Glaxo Laboratories, Ltd. 811 134
Products containing polymerised N-vinyl lactams and polyalkylene imines. Badische Anilin- & Soda-Fabrik A.G. 811 135
Production of acrylonitrile. American Cyanamid Co. 811 136
Glass composition. Owens-Corning Fiberglas Corp. 811 243
Separation of vinyl ethers by distillation. Union Carbide Corp. 811 400
Process for resolving mixtures of organic compounds. Union Oil Co. of California. 811 137
Preparation of aluminium dialkyl monochlorides and aluminium alkyl sesquichlorides. Petrochemicals, Ltd. 811 076
Aerosol preparations. Technion Research & Development Foundation, Ltd., Heimann, H., Kohn, D. H., and Israel, Y. I. 811 079

Method of and apparatus for the calcination of gypsum. National Gypsum Co. 811 246
Process for the prevention of the formation of slime in the manufacture of chemical or mechanical pulp or paper. Osakeyhtio Keskuslaboratorio Centrallaboratorium A.B. 811 191
Additives for gasoline fuels for internal-combustion engines. Badische Anilin- & Soda-Fabrik A.G. 811 406
Treatment of acryamide polymers. Dow Chemical Co. 811 194
Detection of mercury vapour in air or other gas. Drager, O. H. 811 408
Polymerisation of olefins. Sun Oil Co. 811 139
Process for the production of a tissue culture fluid containing infectious hepatitis virus and a killed vaccine therefrom. Parke, Davis & Co. 811 411
Vulcanisation of synthetic rubbery copolymers of butadiene and styrene. Hercules Powder Co. 811 140
Dehydrogenation of aliphatic hydrocarbons. Polymer Corp. Ltd. 811 415
Vapour coating strip material in vacuum. Vameco-Trust Für Vakuum-Technik Reg. 811 263
Nitrogenous heterocyclic compound and a process of making same. Ciba Ltd. 811 416
Steroid compounds. Soc. des Usines Chimiques Rhone-Poulenc. [Addition to 804 480.] 811 205
Process for hydrotreating hydrocarbon solvents. Esso Research & Engineering Co. 811 206
Butene dehydrogenation. Esso Research & Engineering Co. 811 209
Dioline polymer rubber vulcanisers. United States Rubber Co. 811 220
Separators for mixtures of liquid and solid matter. Walker, V. 811 096
Sulphonyl-phosphoric acid esters and process for production. Farbenfabriken Baker A.G. 811 268
Methods of producing an inactivated influenza virus vaccine. Philips Gloeilampenfabriken N.V. 811 099
Amino acid derivatives and methods for producing same. Parke, Davis & Co. [Divided out of 811 103.] 811 104
Amino acid compounds and methods for producing same. Parke, Davis & Co. [Divided out of 811 103.] 811 105

Open to public inspection 8 April

Method of producing electrolytically a bright finish on a uranium or uranium-rich metal surface. Flint, O. 811 432
Deaeration of liquids. Unilever, Ltd. 811 572
Dilactones. Du Pont de Nemours & Co., E. I. 811 499
Preparation of steroid compounds. Glaxo Laboratories, Ltd. 811 632
Polymerisation of ethylene. Farbenfabriken Bayer A.G. 811 633
Coated metals. Permacel Tape Corp. 811 634
Manufacture of active alumina. Pechiney Compagnie De Produits Chimiques et Electrometallurgiques. 811 437
Purifying acetic acid by distillation. Wacker-Chemie G.m.b.H. 811 712
Manufacturing methyl-ethyl-ketone. Soc. Industrielle Des Derives De L'Acetylene. 811 590
Separator of an alkaline electrolytic system. Ions Exchange & Chemical Corp. 811 714
Method of, and apparatus for, the pulverisation of thermoplastic materials. Engel, T. 811 423 & 811 424
Therapeutic compositions. Pfizer & Co., Inc., C. 811 717
Pigmented coating compositions. Imperial Chemical Industries, Ltd. 811 592
Transparent thermoplastic synthetic organic polymeric sheeting. Pittsburgh Plate Glass Co. 811 721
Electrolytically separating and recovering non-ferrous alloys from ferrous materials coated therewith. Clevite Corp. 811 442
Fluid-separator tubes. Sulzer Freres S.A. 811 722
Producing fast dyes on shaped structures of aromatic polyesters. Farbwerke Hoechst A.G. 811 723
Nuclear carboxylation. Eastman Kodak Co. 811 594
Curable polymers. Du Pont De Nemours & Co., E. I. 811 725
Manufacture of copper powders. Berk & Co., Ltd., F. W. 811 507
Nitrogen-containing derivatives of polyhydroxy compounds and process of the preparation thereof. Gyogyszeripari Kutato Intezet. 811 510

Polyacrylonitrile solutions. Courtaulds, Ltd. [Addition to 714 530.] 811 638
Preparation of gelatinised explosives containing nitrocellulose. Hispano Suiza Soc. Anon. 811 731
Tanger. 811 731
Preparation of carbon disulphide. Food Machinery & Chemical Corp. 811 456
Detergent compositions and processes for the manufacture of detergent compositions. Veb Fettchemie, formerly Veb Fettchemie Und Fewa-Werk. 811 732
Method of and apparatus for treating miscellaneous aromatic compounds. Soc. D'Exploitation Des Brevets Alce. 811 515
Electrolysing apparatus with supported membranes. National Research Development Corp. 811 641
Manufacture of hydrogen peroxide. Laporte Chemicals, Ltd. 811 733
Diquaternary ammonium compounds and the preparation thereof. Wellcome Foundation, Ltd. 811 643
Substituted umbelliferone esters of thiophosphoric acids and pesticidal compositions containing them. Montecatini Soc. Generale Per L'Industria Mineraria E Chimica. 811 644
Formation of phosphate coatings. Pyrene Co., Ltd. (Parker Rust-Proof Co.). 811 645
Recovering 8-caprolactam from waste lyes of the 8-caprolactam production. Veb Leuna Werke W. Ulbricht. 811 646
Preparation of active contact masses from kaolin clays. Houdry Process Corp. 811 647
Preparing lubricant compositions and concentrates thereof. California Research Corp. 811 650
Tachysterol. Uclaf. 811 651
Finishing process for polyamide textile materials. Imperial Chemical Industries, Ltd. 811 735
Urea-formaldehyde gap-filling adhesive. Koppers Co., Inc. 811 737
Production of granular salt mixtures containing perborates. Henkel & Cie. G.m.b.H. 811 658
Producing derivatives of l-aryl-3-aminopropanol-1. Farbenfabriken Bayer A.G. 811 659
Treatment of liquids containing crystallisable impurities. Diamond Alkali Co. 811 468
Production of hydroquinone. Ilford, Ltd. 811 519
Metal-containing polyazo colouring matters derived from benzthiazole. Imperial Chemical Industries, Ltd., Davies, R. R., and Pearson, K. W. 811 740
Separators for separating solid particles from gaseous particle conveying medium. Babcock & Wilcox, Ltd. 811 742
Monoazo dyestuffs of the benzeno-azo-naphthalene series and metal complexes thereof. General Aniline & Film Corp. 811 521
Sulphonamides. Smith & Nephew, Ltd., T. J. [Cognate applications 26 057, 35 528 and 3 870.] 811 522
Analysis of gases. Esso Research & Engineering Co. [Addition to 762 008.] 811 744
Monoazo dyes of the anthraquinone azo-naphthalene series and their use in the coloration of synthetic polymeric materials. Fairweather, H. G. C. (General Aniline & Film Corp.). 811 524
Production of polyester resins. Bergwerksverband Zur Verwertung Van Schutzrechten Der Kohlentechnik G.m.b.H. 811 526
Production of high purity hydrogen. Union Oil Co. of California. 811 749
Anti-freeze compositions. Ilford, Ltd. 811 675
Thiophosphoric acid esters and their production. Farbenfabriken Bayer A.G. 811 677

Scottish Section S.A.C. Elects New Officers

At the 24th annual general meeting of the Scottish section of the Society for Analytical Chemistry in Glasgow, under the chairmanship of Dr. Magnus Pyke, the following were elected officers: chairman: Mr. A. N. Harrow, A.H.W.C.; F.R.I.C.; vice-chairman: Mr. A. F. Williams, B.Sc., F.R.I.C.; hon. secretary and treasurer: Mr. J. Brooks, M.A., A.R.I.C., Nobel Division, Analytical Research Section, Ardeer Factory, Stevenston, Ayrshire.

At an ordinary meeting which followed a paper on 'The Identification of artificial colouring matter in food,' was given by Mr. P. S. Hall (Bernard Dyer and Partners, London).

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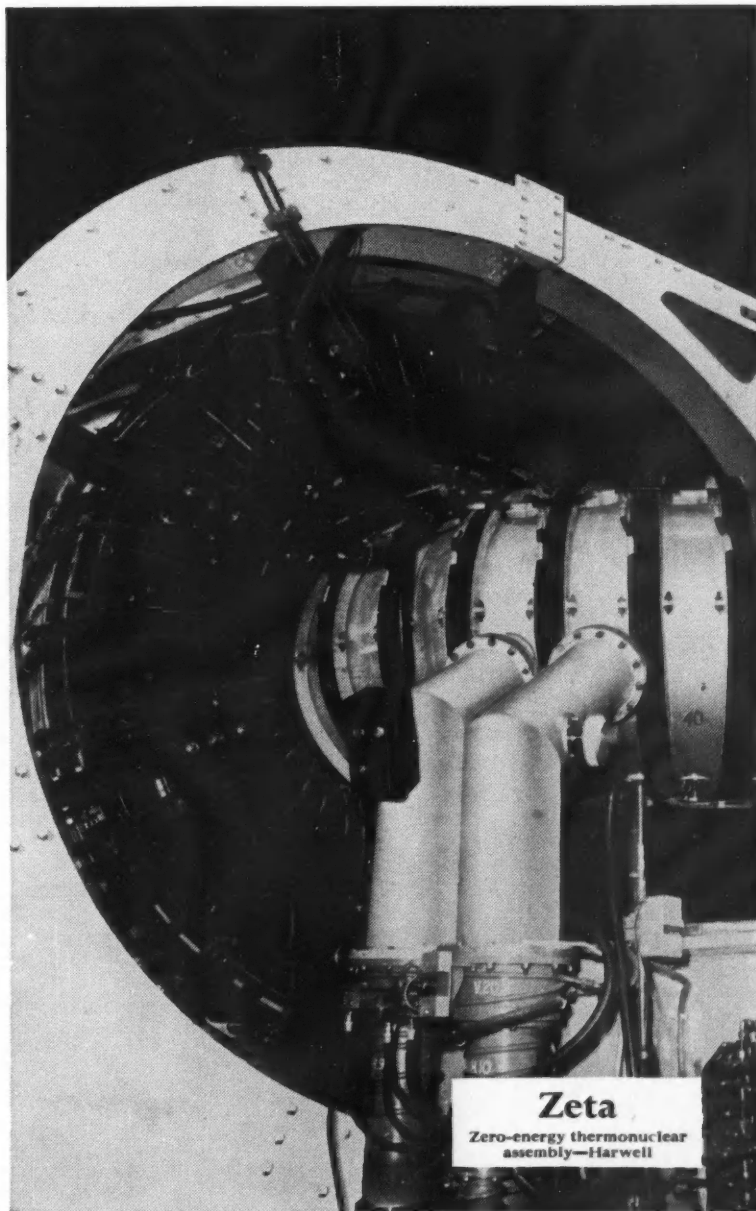
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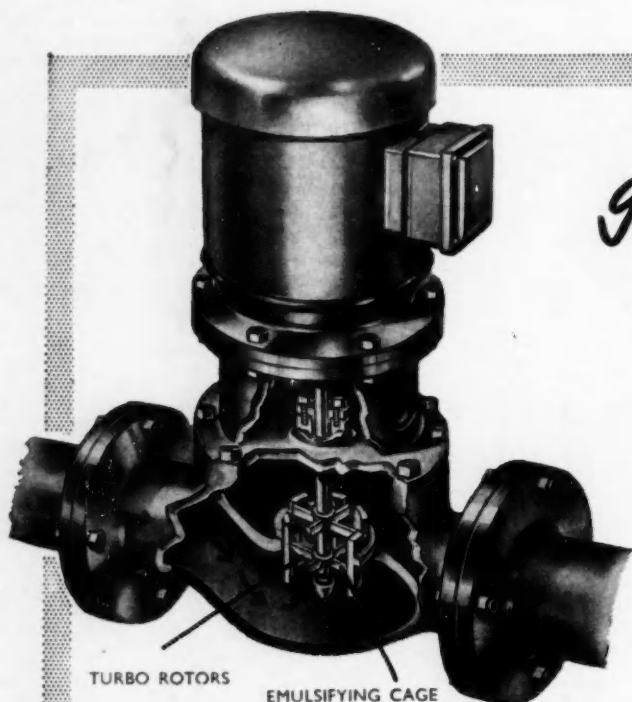


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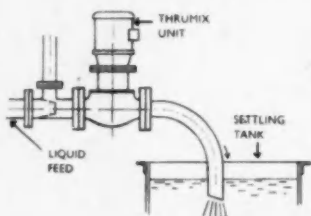
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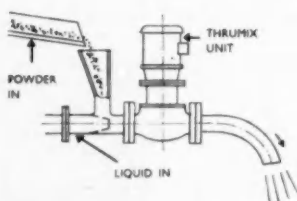
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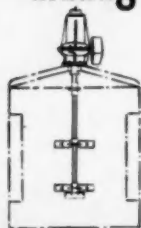


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